Factors and Barriers influencing the uptake of Continuing Professional Development through Distance Education Courses for Professional Dentists

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Submitted for PhD degree.

ACKNOWLEDGEMENT

My heartfelt thanks to Professor Margaret Cox and Professor Brian Millar my supervisors without whose encouragement, support and dedication this work would not have been possible.

ABSTRACT

OBJECTIVES: The objectives of the study were to investigate the factors influencing the uptake of distance education courses by practising professional dentists in India, and also to explore the possibility of adopting distance education as a method for delivering continual professional development for dentistry [CPD] in India.

STUDY DESIGN: The research was performed in three phases. The first phase consisted of a literature review and collection of data through a pilot questionnaire; the second and third phases consisted of data collection through questionnaires. The final data were collected from 201 Indian professional dentists using stratified random sampling using proportional allocations.

RESULTS: The respondents' most important considerations while choosing a CPD course were topic, recognition by their respective Dental Council, Worldwide status of the course provider, and inclusion of a practical component. The results showed that age was the most significant predictor for dentists considering an online course. Dentists within the age group of 25-30 years were 4.92 times more likely to consider an online course when compared to their counterparts in the age group of <25 yrs., and around 73% of the 25-30 age group would consider enrolling in online courses. Academic extrinsic factors such as progressing up the academic ladder and social intrinsic factors such as contributing to society were also shown to be factors influencing the pursuit of CPD. Cost, duration of course, distance of travel, length of course, non-recognition of topics, and non-availability of practical courses acted as barriers to the up-take of CPD amongst the study participants.

CONCLUSION: It was concluded that considering and accounting for the barriers identified, and adopting favourable measures which overcome these during the

course design itself would result in higher preferences for such courses. More in-depth research into these barriers and the factors driving them amongst learners is proposed. This would enable the adoption of distance education as a format to continue professional development in India.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

In the UK, *Continuing Professional Development* (CPD) is a mandatory requirement for dental health care professionals as per regulatory norms of the General Dental Council (Eaton et al. 2011). Lifelong learning has been further emphasised with the introduction of the 'First Five year document' (GDC, 2008). At the present time, it is an expectation from the patients that their dentists be abreast with the most recent scientific advancements throughout their career, to provide optimum quality of care. Globally, this concept has been substantiated by studies conducted in selected territories like in the US, UK, India, Australia and certain European countries to name a few (Abbott et al., 2010). It is therefore, generally agreed that a bachelor degree in dental surgery may not be sufficient for continuing dental practice and providing patient care.

Previous research reported in Chapter 2 has shown that E-learning can be a means for overcoming many barriers prevalent for CPD. Therefore, with growing opportunities for widening CPD participation and increasing access to the Internet and computing facilities across countries and communities, it is an opportune time to investigate the types of barriers that exist for the uptake of CPD by professional dentists, and how these barriers might be overcome by the use of online distance education programmes. A similar CPD policy now is in existence in India, the country chosen as the site of this study, and there has been a prominent trend towards continuing dental education subsequent to graduate and post-graduate studies in this country. Furthermore, with India being one among the leading nations of the world in telecommunication and Internet revolution, there has been great

interest shown in the possibility of providing CPD partly through distance education (primarily E-learning) courses. This interest has resulted in the development of a range of courses across the country, although little is known about the factors that may facilitate or prevent dentists from taking up such courses.

Continuing professional development or CPD is a process which helps professionals manage their own development on an on-going basis. The function of CPD is to help record, review and reflect on what is learnt throughout their career. It is a commitment to continually update their skills and knowledge in order to remain professionally competent and achieve their true potential. CPD is important for a number of reasons:

1. To learn new skills such as teamwork and communication;
2. Improve on existing skills;
3. Learn about new legislation and policies;
4. To keep up to date with any current issues in practice;
5. To give a chance to make queries and suggestions which may improve on practice and the setting;
6. It encourages professionals to reflect on their practice.

When working with patients, learning new skills and improving existing skills are always beneficial. Practitioners must always be evolving in their career to benefit the patients, modifying the way they work.

In a concept analysis of competency, Axley (2008) asserted that "educators should also demonstrate competency in their own practice and make students aware of the lifelong learning required to maintain competency" (p. 221). Her purpose in this analysis was to define how important the aspects of competency were to the practice of professional nurses. In her analysis she found that as a term competency,

was difficult to define however she considered that it was necessary for the development of safe nursing care and therefore for the future of the nursing profession. In the analysis Axley (2008) describes 3 case scenarios to illustrate a "model case" (p. 218), a "borderline case" (p. 219) and a "contrary case" (p. 220) of competency. Dickerson (2012) suggests that nursing competence is a key element of safe patient care. Ongoing competence in nursing relies upon the ability to self-assess his or her practice to identify learning needs. In this respect, professional dentists must also exhibit competency in their professional practice while providing care for their patients. Citing a need for realistic self-assessment, Axley (2008) calls for "competent professionals [to] have an understanding of their own limitations… to autonomously provide safe care according to defined responsibilities, professional standards, education, and qualifications" (p. 221). In order to achieve and maintain professional competence, CPD is a requirement for all practising dentists in the UK. For the health care professionals, CPD covers an array of educational activities that they undertake in order to maintain, develop, and enhance their knowledge, skills, professional performance, and relationships they use to provide care for patients, the public, and the profession (e.g. see Grimshaw, Eccles & Tetroe, 2004).

Previous research, as discussed in the subsequent chapters, has shown that distance-learning courses provide more choice and flexibility of timing and location of study, thereby providing greater ease of access for post-graduates and professionals. In order to accommodate these opportunities, a list of factors involving the practical elements such as course planning, delivery, and moderation needs to be developed. Furthermore, addressing those factors would result in a greater positive impact in the teaching of modern post-graduate clinical dentistry in an E-learning format. Before any advancement is made regarding developing CPD

distance education courses, which would be effective for practising dentists, it is necessary to understand the barriers perceived by dental graduates in India to continue their professional development and how distance education online courses might help to overcome some of those barriers. Furthermore, there is also a need to understand the barriers to the take up of distance-learning CPD and the effectiveness of various course designs in improving professional practices and knowledge of those participating in CPD programmes.

1.2 Need for this Study

There were two main needs identified for this study prior to the commencement of this research. Firstly, as explained above and elaborated in Chapter 2, there has been a huge increase in the development and delivery of distance education courses with major online components, across the world, and in India in particular, in higher education. Likewise, in dental post-graduate education, there has been a growing requirement for professional dentists to improve their knowledge and skills through CPD. Distance education promises significant benefits, but the factors governing it need further investigation. It is unclear as to what the important factors were which encouraged and enabled professional dentists to follow CPD through on-line distance education courses. Secondly, there are many as of yet-unknown barriers to the take up of distance education as well as those which affect the take up of CPD in general.

There have been a number of theoretical models developed based on extensive analysis of empirical evidence as reviewed later in this chapter to identify the relevant factors, there is as yet little consensus about which model might be particularly pertinent to the impact of distance-learning/blended learning on students' learning in Higher Education.

At present, the most comprehensive model for higher education available for this study was that developed by Entwistle (1997, 2004) but this model focused mainly on traditional higher education formats. In these traditional formats, some teaching is done in a classroom, face-to-face , within selective hours with direct interaction between students and teachers, some in laboratories or clinics, or tutorials and there is a substantial element of self-study even within traditional higher education programmes. Distance education format on the other hand, although it includes many of those study approaches used in traditional higher education courses, has a more flexible approach to the overall control of the learner and the staging of the times of study as introduced earlier in this section. Therefore there was a need to investigate the possibility of adopting distance education as a format to deliver CPD in which much of the learning would take place away from an education centre and with less control of the learners' study time and progression. India had both a growing availability of online CPD courses and growing requirement for CPD. Additionally, it provided an ideal setting for this research as it has a large dental professional population and an advanced Internet network which could deliver online components of distance-learning across much of the nation.

India at present has three courses for dentists and doctors delivered through distance-learning format. Among them are two post-graduate programmes namely, a Post-graduate Certificate course in *Endodontics* and a Post-graduate Certificate course in *Implantology*, administered by the Indira Gandhi National Open University (IGNOU), in collaboration with the Dental Council of India launched in July 2008. A combined entrance examination for the admission was held on 1st June 2008. Both the programmes were for the duration of one year; however, there was flexibility to complete the programmes in a maximum duration of three years. The

main benefit of these programmes as stated by IGNOU was that "one does not have to leave their practice and work place area except for the contact programme, as these programmes were through open and distance-learning system". (IGNOU, 2012, p.19).

Additionally, there was no age limit to join the courses and even fresh graduates could apply. The academic content was paper based and the printed course material was delivered to the recipient through the postal delivery system. The practical elements for the courses required attendance five times in a year for a duration of six days at specific centres.

Fifteen centres for oral implantology and eighteen centres for Endodontics were identified and each centre admitted six students for these programmes. The Dental Council of India decided to start these Post-graduate Certificate courses to benefit such Bachelor of Dental Surgery graduates who wished to enhance their knowledge and skills in certain clinical specialities (IGNOU, 2012, p.14-15). It was also observed that at the time of commencement of this study, the Master's programme in Clinical Dentistry (Fixed and Removable Prosthodontics) from King's College London Dental Institute, which was a 4-year programme, was made available for Indian dental graduates with four years' experience through distance education mode. In both these examples, the common observation has been that there was the use of distance-learning to impart CPD to healthcare professionals, including professional dentists without the clear knowledge about the reasons for uptake by these professionals or the possible barriers to the uptake of such a format of education. Therefore, it was decided to investigate the reasons as to why professional dentists might embark on a distance education programme and what kind of barriers prevented them from taking up such programmes. The results of this

research would make a significant contribution to the knowledge in this area and help inform those involved in designing and delivering such courses.

1.3 Aim of the study

The aim of this research project was to investigate the factors influencing CPD choices of professional dentists and barriers to the uptake of CPD through distance education courses. The specific research questions identified were:

A. What were the most important factors which encouraged and enabled professional dentists to follow CPD through distance education courses?
B. What were the barriers which prevented them from continuing with their professional development through on-line distance education courses?

The outcomes from these investigations would show what the possibilities are for effectively adopting distance education as a format to deliver CPD and what barriers need to be overcome to achieve the widest access of CPD to professional dentists.

1.4 Development of Research Framework

In order to address the above questions, a preliminary literature review was conducted to find an appropriate educational framework which could be used to help identify the range of possible variables which needed to be included in the study. Two frameworks were identified namely (a) Institutional Framework on factors affecting students' learning in higher education developed by Entwistle (2004) and (b) The Theory of Planned Behaviour developed by Ajzen (1991).

1.4.1 Institutional Framework- Entwistle

Entwistle analysed the results of research studies conducted at 17 different university departments and the factors which had been shown to affect the impact of

educational innovation on students' learning in higher education. According to Entwistle (2004) (see Section 3.2.3 and Fig. 3.2 in Chapter 3) and other educational researchers, the effects of innovation in education on students' learning were not merely due to the use of an innovation itself but factors relating to student's previous experience, teachers' pedagogical beliefs and practices and course providers amongst many other variables. These factors may also be important contributors to the design of effective online learning environments in higher education. By researching into student barriers and preferences for online courses, we would be able to understand student factors better and thus design the teaching-learning environment accordingly. This framework was used to underpin the design of the questionnaire and analysis used in this research. Therefore, an important outcome of this study has been a modification of the model developed by Entwistle to suit online environments in higher education based on the findings of this study.

1.4.2 Attitudinal Theory- Ajzen

Ajzen, who researched the relationship between attitudes, intentions, and behaviour over many years, developed "The Theory of Planned Behaviour" (TPB) (Ajzen, 1991) based on his earlier "Theory of Reasoned Action" (Ajzen, 1980). According to the application of these models to many attitudinal studies (e.g. Francis et al., 2004), he concluded that changes in behaviour, i.e. adopting an educational innovation, will occur only when there is a strong intention to perform that behaviour. Ajzen's (2002/2006) theory states that an individual's intention (I) in turn is explained by three factors: (i) Attitude towards action (AACT), (ii) Subjective norm (SN) and (iii) Perception of Behavioural Control (PBC). Attitude towards Action is based upon the weighing of advantages and disadvantages associated with the performance of a given behaviour by the individual. Subjective Norm depends on

the individual's perception of whether significant others will approve or disapprove of the behaviour in question. The third aspect is the extent to which an individual believes that he or she has the resources and opportunities required to perform the behaviour, which is referred to as perception of behavioural control (PBC). This refers to what is perceived as 'facilitating' or 'barrier' to perform certain actions.

Using the TPB, a questionnaire was prepared for this research to collect data about attitudes, how significant others perceived CPD, and what barriers respondents' perceived might prevent the uptake of CPD through online courses. Additional questions were included to collect as much data as possible about the other factors which related to Entwistle's model discussed above. A literature review was undertaken, presented in Chapter 2, to compile evidence about distance education courses in India and the factors which influenced the effectiveness of such courses. It also provides a detailed literature review of the relevant research relating to the development and application of DE [Distance Education] followed by its use and effectiveness. It introduces and explores the possibilities and opportunities offered by a third mode of learning called 'blended learning'. It also largely focuses on the key topic of the students' and teachers' perceived barriers to DE and E-learning.

1.4.3 Models of Motivational Design

There have been many other models used to measure students' motivation, satisfaction etc. which previous researchers have used to inform their educational research methodologies, such as Keller's Attention, Relevance, Conflict and Satisfaction (ARCS) Model of Motivational Design (Keller, 2010) which have been used in a variety of disciplines (Stockdale et al., 2008; Stockdale, Sinclair, Kernohan & Keller, 2011). According to Keller, certain conditions must be met in

order for the learner to experience satisfaction in his or her efforts and those conditions are related to the learners' expectations (Keller, 2010). He asserted that intrinsic motivation is more important than extrinsic motivation, particularly in reference to the last element of the ARCS Model, satisfaction. Extrinsic motivation or some kind of positive reinforcement, such as a reward or incentive, lowers one's personal satisfaction with the learning experience. According to Keller (2010), the aim of the ARCS motivational model was to provide guidance for understanding factors which influence student motivation and motivational strategies (Keller, 2010, p. 44).

Wlodkowski (1999) examined the individual's motivation to learn and ways to encourage it effectively, espousing the view that "learning is a naturally active and normally volitional process of constructing meaning from information and experience" (p. 7). Within the context of lifelong learning, Wlodkowski (2003) presented a motivational framework for culturally responsive teaching. He states that in an arena of professional development, emotional reactions to instruction can heighten or dampen an individual's desire to learn. In this framework he gives 4 motivational conditions which both the instructor and the learner have to create or enhance in order to develop intrinsic motivation in a professional development programme: establishing inclusion, developing attitude, enhancing meaning and engendering competence (p. 40). For dentists, the need for continued lifelong learning and as a requirement for continuing registrations with the professional bodies, has been mentioned earlier in this thesis. Effective motivation to engage in professional development would be of benefit to the professional's long-term skills acquisition and learning.

Kim and Keller (2008) examined the element of volition within the context of higher education. In the 2008 study, they explored the type of supportive information needed for, and effective in improving an educational situation wherein there are serious motivational challenges. They improved the attitudes of students by providing additional support through email messages. This supports Ajzen's theory of planned behaviour, which has shown that where the learners have positive attitudes to learning then there is a stronger intention to learn.

Gormley, Colella and Shell (2012) applied Keller's ARCS Model for both a traditional face-to-face classroom situation and in an online environment (p. 180). They also applied the ARCS Model to Web-based or distance-learning instructional design. The focus of these studies was the identification of methods and guidelines for incorporating motivational tactics into computer-based and distance-learning environments, and manipulating confidence and performance in an online course.

The literature review undertaken in Chapter 3, analyses the different educational theoretical models which can contribute to the theoretical underpinning of this research. Chapter 3 also investigated the various theoretical models of higher education used by previous researchers which enabled us to adapt and adopt the chosen study model to conduct research in the present study. The chosen models developed by Entwistle (2004) and Ajzen (1991) served as a theoretical framework for designing the present study. Based on these literature reviews, questionnaires were prepared for the study and later utilised as a tool for primary data collection. Subsequent to data collection, the data were compiled and an exhaustive analysis was undertaken to understand the reasons and factors that facilitated the uptake of E-learning CPD courses and in addition to identify the barriers for distance CPD education.

The remaining chapters of this thesis are as follows:

Chapter 4 discusses the design and methodology utilised in the current study; the common questions regarding the uptake of CPD such as, what are the important factors encouraging people to take up CPD? What are the barriers that exist? What format is required to adopt to overcome these barriers was addressed in this chapter.

Chapter 5 presents the results and their analysis from the questionnaires survey elaborated in Phases 1 and 2 and discusses the impact and affects of factors such as age, gender, time since graduation, work place, availability of high speed Internet, travel time, attitude of the dental surgeons etc., on the uptake of CPD through online courses.

Chapter 6 analyses the results of Phase 3 of the study. The profiles of respondents were assessed based on their demographic and social profile. It was possible to arrive at a conclusion regarding the factors which influenced the respondents' decisions to choose online courses.

Chapter 7 provides a summary and discussion of the findings organized around the research which gives a concise review of the methodology, instrumentation and data analysis procedures used to conduct this study. It also offers implications and recommendations for further research in this field.

CHAPTER 2: LITERATURE REVIEW

This literature review has been broadly divided into two sections focusing on (a) the historical research background, development, application, and review of the effectiveness of distance education as evidenced to date and (b) the barriers to distance education [DE] identified from previous research studies.

In the first section, traditional versus distance education was analysed to compare the advantages and disadvantages, which in turn led us to explore the possibilities and opportunities offered by the third mode called 'blended learning'. Previous research has shown that while distance education has the potential to solve major issues regarding quality, cost and access to education, it raises other issues such as quality assessment of courses, learner retention, learner and instructor satisfaction, technology access, and use. Therefore in this chapter, an effort has been made to find the possible answers to these questions.

The second part of this chapter largely focuses on the key topic of students' and teachers' perceived barriers to DE and E-learning reviewing the general barriers that exist for the uptake of distance education courses.

In this chapter, an effort has been made to compare traditional and distance education, and to understand if blended learning offers the best of both traditional and distance education. Also, understanding the concept of blended learning and its evolution thus far was done to determine what is already known and what is unknown. Additionally, an attempt to understand the concerns of DE in Asia, particularly in India has also been made.

2.1 Historical background and review of effectiveness of distance education

2.1.1 Traditional education versus Distance Education

As we already know, institutes of higher education currently offer programmes broadly in three different modalities. They are: (i) traditional lecture/tutorial/laboratory based-full time; (ii) virtual (includes distance and E-learning); and (iii) blended learning (multimodal which combines traditional and online learning). As it is not within the scope of this thesis to go into the details regarding the functioning of the traditional 'face-to-face ' mode, which is mostly used in higher education, an analysis of the relative merits and de-merits of traditional and distance education modes would provide us with a better understanding (Valladares, Conejero, Cooper, Castillo & Robledo, 2010). Each of these modalities provides education in their own unique way and there are certain inherent advantages and disadvantages associated with them. Therefore, an attempt has been made to compare traditional and distance education for better clarity.

Traditional education brings student to the educational institution facilitating teaching and learning by location and time. It also encourages face-to-face communication, enables team work with peers, and promotes a social environment. Many of the previous studies have revealed that students preferred face-to-face class contact and felt web-based learning frustrating (Sweeney & Ingram, 2001; Ponzurick, France & Logar, 2000). Class-learning has been found to encourage better learning, as students get more chances to enhance their skills through encouragement by the faculty. This view was supported by an earlier study by Guskey (2003), who claimed that classroom assessment enabled students to improve

their learning as it helped useful assessments, provided corrective instruction, and gave them a second chance to demonstrate success. However, in contrast, some other studies have revealed that interaction during Internet-based learning mimicked the 'Socratic method' of traditional classroom and helped the students learn better (Kennedy, 1999). In the last 10 years since Guskey's study the design and scope of online distance-learning courses have enabled students to share their knowledge and understanding with fellow students thereby benefitting by many of the learning experiences previously only available in a traditional settings.

Distance education is any mode of learning where teacher and student are not present at the same place or time. It can be pursued either through postal or online modes. The advantages of online learning have been listed as being interactive with direct feedback, media enhancement, opportunity for students to learn at their own pace, and sharing of information among students. The integration of technology and learning is believed to lead to more student participation and teamwork, higher test scores (Priluck, 2004), better quality of study materials, use of formative assessment tools, and integrated summative assessment methods (Bach, Haynes & Smith, 2007). In a 'natural experiment' that directly compared traditional versus distance education formats; distant learners performed considerably better than traditional classroom learners (Souder, 1993). A study into the effects of e-Learning on Higher Education by Singh, O'Donoghue and Worton (2005), claimed that distance or E-learning has the potential to change not only the way society retains and accesses knowledge but also transforms and restructures traditional models of higher education, particularly delivery and interaction.

Akins, Check and Riley's study (2004), has shown that in online art appreciation courses, the Internet, chat rooms, blogs and e-mail have actually

brought learners closer to teachers as well as to other learners so much so that these media are called ‘lifelines’ by the authors. Theoretically, they called these lifelines transgressive (acts of liberation) in that they were acts of knowing often not permitted in many public, social, or educational venues. Distance education and the Internet offered alternative teaching formats that felt less authoritarian and more intimate, possibly closer to the ways each of us asked life questions. One of the authors (Riley) writes ‘I found that my communication with students was actually more frequent and detailed than in a traditional classroom. I eventually found ways to create a "class room," complete with cohort groups and mutual interests online. I also found that online teaching provides students with resources often lacking in face-to-face classrooms, such as the ability to reference previous materials and discussions when memory fails or the teacher is unavailable (one factor that is leading many instructors to incorporate online support)’ (ibid., p 36.)

Online art appreciation classes are on a different level when compared to highly technically skilled courses like implantology in dentistry. Getting closer personally to vent their feeling between teachers and students is one thing and learning a technique to perfection where patient health is concerned is entirely another matter. There is also no supportive evidence to prove whether online art courses could be extrapolated with other technical courses, which are involved in providing patient healthcare. Although, there is no doubt that distance education breaks down several barriers like disability, age, socio-cultural background, and finance as it provides the learner with flexibility of time and space and enables greater proportion of students to continue their education who otherwise would not have, there are certain disadvantages also. While it is also generally accepted that DE has come to stay, there is still lot of resistance to accept its benefits. This has led to

numerous research studies comparing DE to traditional classrooms to analyse the advantages and disadvantages and it was discovered that there were some inherent disadvantages to it too.

A high dropout rate due to the feeling of isolation (Priluck, 2004) is also associated with distance education. In a study on Distance Learning: Promises, Problems, and Possibilities, by Valentine (2002), he discussed the shortfalls of distance education. Issues in distance-learning by Sherry (1995), details the factors which influence success or failure of distance education. One of the problems faced by the students who opted for distance education was unusually a lack of flexibility as claimed by proponents of distance education. For example, books can be carried anywhere, however computers meant students had to sit and study in a fixed place, although this may no longer be relevant due to mobile technology. In another comprehensive review of 125 studies between 1990 and 2009, Shachar and Neumann (2010), found that distance education students achieved significantly more compared to classroom students.

Previous research data in support or against traditional or distance education has not been entirely consistent and the information is based on specific combinations of technology, the learner groups involved or the way technology was put to use in the studies under consideration. However, it can be concluded that both methods offer certain advantages but also carry certain disadvantages with them. A combination offering the best of both modes probably holds the key to overcome disadvantages while enhancing the advantages. This has led scholars to explore if there is a third way that offers us the best of both. The answer to this question lies in a third modality called ‘blended learning’. My research at later stages focuses on the

advantages of blended learning in continuing professional education for practising dentists.

2.1.2 Distance Education

In the quest for improving skills, expanding the knowledge base and keeping pace with a highly evolving world updating with latest developments are highly important for the modern day technical work force. In order to achieve this, distance education probably holds the key as it eliminates the problems associated with space and time. Distance Education is not just an alternate means of education in today's world, in the past fifty years it has made leaps and bounds in possibilities and ways of reaching out to all sectors of mankind. It originated in the 1880's and evolved through five generations, through different technological media such as post, television and radio, open universities, teleconferencing and presently through the Internet often known as E-learning (Moore and Kearsley, 2012). Webster and Hackley (1997) say, 'Technology-mediated distance education is becoming an important option within education because it facilitates the sharing of costs, information, and expertise among multiple sites while providing additional educational opportunities for distant or disadvantaged locations' (pp. 1282-83).

The word 'Distance education' or 'Distance learning' encompasses several forms of learning and instructional modes using a variety of technologies and amalgamations with regular courses (Moore and Kearsley, 2012). Its reach is also wider than what it was twenty years ago. Simply defined, it represents 'the various forms of study at all levels which are not under the continuous, immediate supervision of teachers present with their students in class-rooms or on the same premises but which nevertheless benefit from the planning, guidance and tuition of a tutorial organisation' (Crooks, 1983).

Distance education also encompasses several other terms today such as ‘online learning’, ‘web-based learning’, ‘E-learning’, etc. The distinctions were made clear by Kennedy (1999) who defined “Online learning” as a form of distance education that refers to instruction and other support resources that are accessed through a computer which can either be delivered via local media, such as CD-ROM or DVD disks, or through the Internet. The use of Internet technologies to communicate and collaborate in an educational context is generally referred to as web-based learning.

Distance education can be broadly classified based on the technology used in its delivery into two types: Synchronous and Asynchronous (Hrastinski, 2008). Synchronous technology is a mode of online delivery where all the participants are "present" at the same time requiring a timetable to be organized, for example web conferencing. Other examples of synchronous technology are web-based Voice over Internet Protocol (VoIP), telephone, videoconferencing, direct-broadcast satellite, and Internet radio and live streaming. Asynchronous technology is a mode of online delivery where participants access course materials on their own schedule. Students and tutors are not required to be together at the same time. Audiocassette, message board forums, e-mails, printed course materials, voice mail/fax and videocassette/DVD are examples of asynchronous technology.

Based on the technology or combinations used, different types of distance education courses can be created. According to Indira Gandhi National Open University (IGNOU) these can include (a) correspondence conducted through regular mail; (b) Internet conducted either synchronously or asynchronously; (c) tele-course/broadcast, in which content is delivered via radio or television; (d) CD-ROM, in which the student interacts with computer content stored on a CD-ROM;

(e) Pocket PC/Mobile Learning where the student accesses course content stored on a mobile device or through a wireless server.

"Integrated distance-learning" is another form where the integration of live in-group instruction or interaction with a distance-learning curriculum.

With the above descriptions I can arrive at the conclusion that distance education is a significantly broad term under which any mode of learning where teacher and student are not present at the same place or time can be included. However, they need to be connected either synchronously or asynchronously using different modes of connectivity.

2.1.3 Characteristics of Distance Education

The possibilities opened up by Distance Education especially in terms of widening reach, creating educational opportunities, providing flexibility and continuing professional development has held a lot of promise ever since its potential was realised. Crooks (1983) described how students, courses and logistics and costs are dealt with using a radical approach in a DE system. More importantly, distance education is termed radical because there is a radical change in the construction and delivery of course contents. It offers a constructivist transaction between students and teachers. In the constructivist approach, the student is the centre of the instruction and has an active role in learning by the support of the technology (Isman and Dabaj, 2004). Distance education has the potential to solve major issues regarding quality, cost and access to education. It also uses novel methods to spread education. Distance education has the potential to offer freedom of choice and convenience of time and space of education. Unlike traditional methods, a student can learn according to their convenience. Distance education can also provide the opportunity for sustainable education to enhance skills and

knowledge limiting the time constrains. It also offers true empowerment in the sense that both students and teachers have equal responsibility to make the system work.

The specific enhancement which distance education has been shown to make are as follows:

1. Students: Distance education courses have succeeded in opening up educational opportunities to new target populations previously deprived and the identification of these particular target groups and their characteristics leading to the design of appropriate courses, learning methods and delivery systems.
2. Courses: Previous studies have shown that there can be greater flexibility in the curriculum and content of learning materials, for example, modular structures or credit systems and individualised instruction with the planned use of a wide range of media and other resources.
3. Logistics and costs: Logistics and costs are characterised by:

a) Greater flexibility compared with conventional systems in methods of implementation, teaching methods, and the student groups covered. Additionally, it encompasses the centralised, mass production of standardised learning materials thereby reducing costs.

b) Enabling a systematic use of existing infrastructure and facilities as part of the learning system;

c) Having the potential to significantly lower recurrent unit cost per student than that obtainable through conventional teaching arrangements, together with a lower capital cost per student.

However, in recent years, online education is no longer considered as a radical idea but a reality, with people completing classes, programmes and degrees at

a rapid pace. As millions of students the world over seek distance education for fulfilling their educational needs, there is a need to understand the dynamics of the virtual classroom, to identify learner needs and difficulties, instructor roles and knowledge, and the technology human interface as the three key components: learner, instructor and technology interact.

Research can no longer be based on quantitative accounts of dropouts and pass percentages or about economic viability. Instructor knowledge, the learners need and difficulties and the technology interface interact in different ways from the traditional classroom and as demand for courses increase and universities and course providers compete to meet it, there is a need for understanding this interaction. Nagelhout (2006) refers to Cook and Grant-Davie's (2005) view of teaching through electronic media as an 'informed practice' rather than as a 'replacement practice' the new 'technological spaces' created by distance-learning require us to introspect on our teaching activities rather than merely consider them as 'new trends'.

2.1.4 Distance Education Research

One of the aims of researching distance education is to determine whether technology assisted distance education (DE) provides the same effectiveness as traditional education. The key to understanding the dynamics of distance education is to focus on certain important variables.

The frequently asked questions about distance education can be clustered in five areas namely (Willis, 1993):

1. Whether technology assisted distance-learning is a method as effective as the traditional method of education;
2. The factors determining the most effective mix of technologies;

3. Characteristics of teachers and students in successful distance education programmes;
4. Importance of interaction between students and teachers;
5. Costs involved in the planning and implementing distance education programmes

Similarly, Kaul (1997) who conducted an early survey of open and distance education found that most earlier research conducted in India tended to focus on descriptive surveys confined to comparisons of enrolment trends and academic achievement. The methodology used for these studies relied mostly on descriptive survey approaches, experimentation for testing the efficacy of various approaches/ models, and qualitative data analysis. In a more recent study by Passi and Mishra (2004), they claimed that for distance education when selecting research areas and design, emphasis should be placed on interdisciplinary and systemic research rather than traditional disciplinary research. Research methods used to evaluate the effectiveness of distance-learning courses were identified as: student self-reporting, extensive and highly targeted interviews, conversation and discourse analysis. Because of the different medium and learning opportunities identified above, research in distance education needs to be different from the approaches used in traditional education. Finally it was concluded that it would be useful to research in this category using certain variables ranging from learner characteristics, learner outcomes, materials used, instructor characteristics, methods of instruction, and pedagogy.

Even in a very recent research review of trends in distance education research conducted by Bozkurt et al., (2015), they found that "it can be assumed that most of the quantitative DE researches are descriptive statistics which show or summarize

sample data rather than inferential statistics which are used to test hypotheses and make estimations using sample data. This finding also supports and demonstrates a similarity to Panda's (1992) conclusion for Indian distance education literature. He reported that most studies were descriptive surveys or experimental studies with poor methodological footing." (p. 6). Therefore the research coverage of this PhD aimed to augment the previous findings by including testing the hypotheses that there may be barriers to the take up of distance education delivered through elearning which go beyond previous factors such as cost and accessibility.

The research variables relevant to this PhD study shown in Fig. 2.1 below were identified from previous research as (a) technology/delivery, (b) instructional methods (c) teacher, (d) learners, (e) subject of study, (f) methods used for evaluation of DE (g) quality assurance in DE and are discussed in detail below..

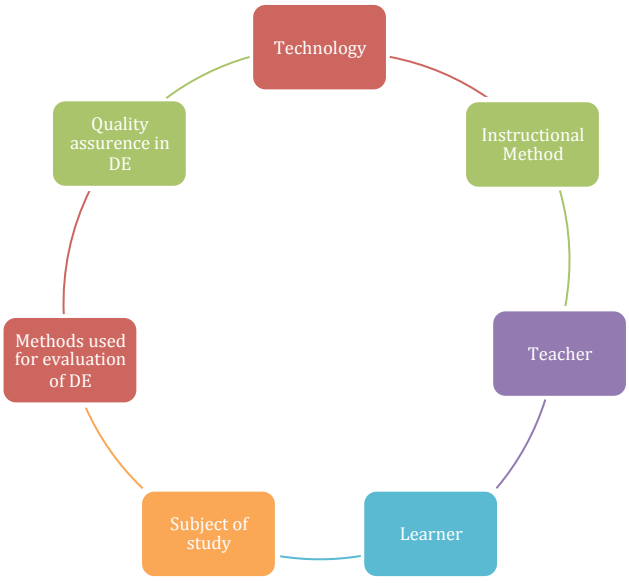

Figure 2.1 – Schematic representation of seven key research variables in DE (Note: These variables are not interconnected to each other and are only diagrammatic representation)

Additional variables were identified from a review of the educational models discussed in Chapter 3

a) Technologies in Education

The emergence of new technologies has been accompanied by a search for the potential value of improving access, opportunity and quality of education. Every new technology has been tested for its usefulness in teaching, learning and training. Innumerable media studies were conducted between 1960s-1980s to study the effectiveness of one media over the other especially with the view of exploring the education of masses. Though new technologies have kept emerging, some, like print and radio have been hard to replace. Radio remains a very viable form, especially in the developing nations, because of its reach. For example, Australian children living in extremely remote areas have been participating in the "School of the air" (2016) since the 1940s using 2-way radio. In India, the FM Channel is very popular and is being used by universities, to broadcast a variety of educational programmes on areas such as teacher education, rural development, and programmes in agriculture for farmers, science education, creative writing, and mass communication, in addition to traditional courses in liberal arts, science and business administration.

The period until the mid-eighties saw a growth of media enabled studies which revolved around the use of print, radio, television, and computer media (Heydenrych and Prinsloo, 2010). The media or the medium that enabled these studies were called ‘delivery systems’ in distance education and every course provider could select one or a combination of several media for providing distance education. It is hard to distinguish between studies that are ‘media enabled studies’ [any distance education programme that utilises technology for delivery of the programme. Here a candidate opts for a distance education programme which is

enabled by some form of media] and 'delivery technology studies' [technical study about the mode of media, for e.g. it could be about television or Internet etc. Here the candidate studies about the technology used for delivery] in distance education. Essentially, there is still a need for undertaking media enabled studies as new technologies like chat rooms; e-mail, teleconferencing and the Internet modify the meaning of education.

Based on the operational technology utilised, distance education can be classified under a certain model of teaching which in turn corresponds to a particular 'Generation' of distance education. Taylor of Queensland University (Taylor, 2001), gave a conceptual framework describing how distance education evolved through four generations leading to a fifth generation shown in Table 2.1 below. According to him, distance education can be classified into generations based on the type of operational technology. In the first generation, it operated mainly through correspondence backed up by tutorials, summer schools etc. The second and third generations were both multimedia models (Heydenrych and Prinsloo, 2010). The various modalities in second and third generation were print, audio-tapes, video-tapes; computer based learning, interactive video, teleconferencing, video conferencing, TV broadcast and others. The fourth generation was a flexible learning model that used interactive multimedia online. The fifth generation, a derivative of the fourth generation, is based on an intelligent flexible learning model that uses automated responses. In the fifth generation, the institution variable cost can approach zero which can be a significant improvement over the fourth generation model. Each new generation has benefitted from previous generations' trials and feedback resulting in very extensive distance education programmes available now in most higher education disciplines.

These technologies listed in Table 2.1 have added a new dimension to the meaning of learning, interaction, formal classroom and assessment. They have challenged the teacher's role in keeping student interest in learning and utilising technology for something more than an instant source of thrill or entertainment. The increasing popularity of mp3 players, PDAs and Smart Phones has provided additional media for the distribution of distance education content, and some professors now allow students to listen or even watch videos of a course as a Podcast. Defence Activity for Non-Traditional Education Support (DANTES) have been working with the U.S. military, to distribute entire course content on a PDA to deployed personnel (DANTES).

Table 2.1 Generations of Distance Education (Fozdar and Kumar, 2007, P.3)

Generation	**Model**	**Delivery Technology**
First Generation	The Correspondence Model	Print
Second Generation	The Multi-media Model	Print, audio-tapes, video tapes, computer-based learning (e.g. CML, CAL, IMA), interactive video, disk and tape
Third Generation	The TelE-learning Model	Audio teleconferencing, video-conferencing, audio-graphic-communication, broadcast TV and radio.
Fourth Generation	The Flexible learning model	Interactive multimedia (IMM) online, Internet based access to www resources, computer-mediated communications
Fifth Generation	The Intelligent Flexible learning Model	Interactive multimedia (IMM) online, Internet based access to www resources, computer-mediated communications, using automated response systems, campus portal access to institutional process and resources

In an investigation by Uzunboylu, Cavus and Ercag (2009), Mobile Learning (ML) or m-learning, (another relatively new concept that has attracted the interest of educators, researchers, and companies developing learning systems and instructional materials), they studied the use of mobile technologies, data services, and multimedia messaging systems to increase students' use of mobile technologies to develop environmental awareness. Data were collected to measure the "usefulness of mobile learning systems" from a questionnaire sample of 20 male and 21 female undergraduates enrolled in computer education and instructional technologies classes at the Near East University in North Cyprus. Students voluntarily participated in a six-week programme using mobile telephones to transmit photographs of local environmental blights and to exchange pictures and observations.

Participants learned ways to maintain clean environments and increased their awareness of environmental concerns. The aims of the study were to find out the relationship between ML and environmental awareness, especially the role of gender and grade in ML and environmental awareness. The key outcome of this research, relevant to this PhD study, was that across gender and grades participants expressed satisfaction with the capacity of using ML as it enabled them to use it anywhere, any place, and any time. The mobile devices provided a means of engaging students and developing positive attitudes towards maintaining a good environment. More importantly, the use of mobile technology enthused the participants who were comfortable using it. It was concluded that in the long term ML would be likely to provide a suitable platform for use in a wide range of educational settings. On the other hand, research has also shown that students have faced distressing experiences due to communication breakdowns and technical difficulties during distance education programmes (Hara, 2000, Galusha, 1997).

The use of the latest technologies brings new challenges to the fore. The challenge faced by providers of distance education and open universities is to exploit the potential of these new technologies to meet educational goals. Longworth and Gwyn (1989) claimed that ‘Distance Education is not always so much about setting up of infrastructure and the use of multi-media delivery systems, it is often more about how particular groups of people in particular educational environments use them (a) to improve practically their knowledge of the system and (b) to create new educational materials that can be used in distance education while incorporating the strengths of various components of multi-national elements’. P. 79

With the advancement in new technologies and with the increase in their use in distance education, viability and feasibility studies are very important, especially in a scenario when such an enterprise is carried out by a nation that is more technologically advanced compared to many other nations. This is because the infrastructure, underpinned by technology, plays a key role in delivering distance education. Infrastructure in this scenario may range from a well-established postal system to computers and Internet connectivity throughout the length and breadth of the nation. However the mere establishment of infrastructure may not be the answer to delivering quality education. More particularly, while delivering an extremely technical course online, the design of the course may not be entirely dependent on delivery technology alone. In such a scenario, both online delivery of courses and face-to-face contact becomes critical. This has provided the impetus for the third learning mode called 'blended learning' where both traditional and distance education are used.

b) Research on Instructional methods in Distance Learning

According to a range of studies of specific variables associated with traditional and distance-learning, elaborated below, when the variable studied was 'student achievement', there was no difference found between distance-learning and the traditional classroom. In a study conducted by Webster and Hackley (1997) they found no difference in student achievement between technology–based instruction and face-to-face instruction and interactive video instruction. The studies substantiating this view include Bullock and Ory (2000), quoting two reviews that came to similar conclusions. A review of previous research on the effectiveness of Distance Learning in Higher Education (including synchronous and asynchronous instructional delivery) by the "Institute for Higher Education Policy" (Gold and Maitland, 1999), concluded that with a few exceptions, the learning outcomes of students learning using technology as in distance education, were similar to the learning outcomes of students who participated in the conventional classroom. This conclusion was also supported by Russell (2001) who conducted a meta-analysis of 355 previous studies that evaluated the impact of technology-enhanced instruction.

In a report entitled 'The no significant difference phenomenon', Russell emphasized the reoccurrence of the researcher's conclusion of "no significant difference" on a variety of outcome measures, between students taught using technology and those who were not. The outcome of results from such comparative studies was not the same when more variables were considered. When studies took into account variables such as student and instructor satisfaction, student attitudes and the process of instructional design, it was also necessary to look into qualitative aspect of the unique instructional process in distance-learning. Descriptive studies

presented by Haythornthwaite and Kazmer (2004); Akins et al., (2004), gave a better understanding of the impact of the instructional method used in distance-learning.

In these descriptive studies Akins et al. (2004) examined the possibilities of technologies as lifelines, as they witnessed them, as artists, teachers, and students traversing the Internet for information, teaching, making art, dialog/chat, sanity, and survival. Theoretically, they called these lifelines transgressive (acts of liberation) in that they are acts of knowing often not permitted in many public, social, or educational venues. Online appreciation classes did provide new insights into student and instructor satisfaction, attitudes and process of instructional design. But the study did not provide answers to the question whether a highly technical skill like implantology in dentistry can solely rely on satisfaction of instructor and students. There was also no supportive evidence to prove whether research findings for the effectiveness of online art courses could be extrapolated with other technical courses, since those involved in providing patient healthcare include topics involving face-to-face tuition for advanced practical dental or medical skills .

Bach, Haynes and Smith (2007) identified an important aspect which needs to be taken into account when we design online learning experiences in higher education: specific characteristics of the learning process related to adults. They cite Knowles and his term “andragogy” to introduce it and talk about the role of tutors in this process. They agree that the relationship between tutor and student is based on collaboration and construction of knowledge; thus, they hold the opinion that their “new role” has to be supported through professional development time for tutors and a policy for online learning based on educational values and research.

Cook and Grant-Davie (2005) conducted a comprehensive study to identify and describe effective and satisfying pedagogical designs to provide guidance in making technological delivery choices for professional communication in distance education. Using both quantitative and qualitative methods, they compared two Internet based pedagogical designs: i) presentational and the other, ii) interactive, focusing on outcomes such as student literacy achievement, student satisfaction, website design and usability. The six layers of literacies levels that were considered were ethical, critical, rhetorical, social, technological and formal or basic which underlie current trends in professional communication pedagogy. Using this framework, the researchers assessed a sample curriculum (its goals, assignments and activities) to identify the literacy which were most articulated in it. They then described how translating this curriculum for online delivery modified and shifted its curricular goals. The findings suggested that two designs can be viewed as effective depending upon the course goals and outcome expectations.

The researchers found that both designs were satisfying to students and both achieved multiple literacies. However, the interactive design was more likely to develop social, critical and ethical literacies though its drawbacks included more time commitment from both instructors and students and was less effective when instructors were working with large groups of students. The researchers concluded that instructors would be better able to decide what distance-learning courses would include and how they would be taught by understanding how instructional designs and technologies for distance-learning can be customized based on curricular goals and literacies.

After analysing the various studies one can conclude that when studies were confined to comparing instructional methods in DE and traditional classrooms, ‘no

significant difference' was found in terms of student achievement, but qualitative studies which included more parameters like satisfaction, social and critical aspects, collaboration, etc., did show a difference in the nature of the interaction in a DE classroom. Instructor communication skills and newer roles to adapt to distance-learning were desired and emphasised. This leads us to review in depth research into another key variable namely 'instructor' in the field of distance education.

c) The Instructor

According to the different studies discussed in this chapter, teaching styles, teacher characteristics such as familiarity with technology, attitudes towards technology, interaction styles, use of enriched media, have been found to have a great influence on the learner outcomes such as achievement, attitudes and cognitive engagement.

Bawane and Spector (2009), have researched into online instructor roles and found that the range of competencies needed by them are varied and wider than traditional classroom instructors which has implications for teacher training. The main purpose of their research was to explore the literature regarding online instructor competencies that may be useful in developing training and curricula for online teachers in India and elsewhere. They claimed that the culture and context would decide which roles gain emphasis over which others. The investigation reported in this article obtained expert opinions with regard to the priority and criticality of eight online instructor roles identified in earlier research on online education. Pedagogical roles received the highest priority by the respondents, followed by professional, evaluator, social facilitator, technologist, and advisor, administrator, and researcher roles. These results have implications for teacher education and further research pertaining to the context in India.

Bawane and Spector (2009) concluded that in all of the studies they reviewed, it was seen that the focus has largely been on determining the online instructor competencies and only a few have gone further to measure the evolved list of competencies in terms of their level of expertise (Varvel, 2007; Aydin, A-Zer & Arasil, 2005; Denis, Watland, Pirotte & Verday, 2004; Richey, Fields & Foxon, 2001). This calls for more investigation into the kind and level of expertise required among instructors to perform their roles. Panda and Mishra (2007) investigated faculty attitude and motivation as important factors determining an effective shift from traditional distance education delivery to web-enabled education and training. According to them, attitudinal pre-dispositions and institutional and allied barriers (including appropriate policy initiatives) are assumed to play a crucial role in making an effective shift from traditional distance education delivery to web-enabled education and training. Such issues were especially critical to single mode mega universities like the Indira Gandhi National Open University (IGNOU). Their article reported the findings of a study conducted to examine the attitudes of faculty members from IGNOU towards E-learning, and to identify barriers and motivators of E-learning adoption and use.

IGNOU, with about 1.5 million students scattered over 32 countries, has been offering 1000 courses in 125 programmes [IGNOU 2006] in distance education programmes for almost a decade. The findings suggested that extensive use of computers and email has a high relationship with positive attitudes towards E-learning. The most significant barriers perceived by the faculty included poor Internet access by students, lack of training on E-learning, followed by institutional policy on and instructional design for E-learning. The study concluded that although removal of barriers to E-learning was necessary, it was not sufficient in itself to

adopt E-learning and participate in the E-learning enterprise. Therefore, they also asked the respondents to identify possible motivating factors in a similar manner as barriers. The important motivators included personal interest to use technology, intellectual challenge, and sufficient provision for technology infrastructure. They concluded that the design of online learning should include:

1. Conducting online faculty development programmes to provide training on both technology and pedagogy of E-learning;
2. Providing easy access to computer and e-mail; and encouraging their daily use by faculty;
3. Ensuring reliable access to network and technology support for maintenance;
4. Removing barriers to E-learning especially by providing Internet access to students. This was essential for developing countries like India.
5. Creating an environment of sustainable E-learning by encouraging the motivating factors

In summary, Bach et al. (2007) and Bawane and Spector (2009) spelt out the need for training of instructors for online teaching. Apart from training, Panda and Mishra's (2007) study brings out the fact that faculty attitude and motivations are important factors determining a shift from traditional DE mode to a web-enabled mode. Furthermore, students' attitudes towards computers as noted by Panda and Mishra, and access to the Internet as noted in IGNOU programmes seem to be important variables that affect teaching through E-learning.

d) The Learner

A brief look at Oblinger and Kidwell's (2000) classification of distance learners helps to categorize the members of this versatile group and identify the type of learner being researched in this study. They provide a classification of different

types and categories of learners as defined by the University of North Carolina and Price Waterhouse Coopers to show the levels of control, commitment and responsibilities associated with each category as follows:

1. Life fulfillment learners are interested in education for its own sake. They enjoy learning in an academic environment, and they view additional education as a hobby or a source of personal development. They make their own decisions whether or not to purchase education.
2. Corporate learners seek education to advance their careers with their corporate employers. Here, purchase decisions (of the training programme) are made by the corporation not by the individual. Corporate learners demand a broad range of services, from instructional technology, end-user training, to advanced scientific training.
3. Professional enhancement learners are seeking to advance their careers or shift careers. They work for companies but are making the decision to purchase further professional development themselves.
4. Degree completion adult learners are seeking to complete a degree later in life than usual. They are frequently working adults who must balance work and family responsibilities with their educational goals.
5. College experience learners (a.k.a. the "traditional student") are preparing for life. This segment includes many 18-to-24-year-old residential college students for whom the "coming of age" process is as important as academic learning. They may make the purchase decision themselves or it may be made by their parents.
6. Pre-college (K-12) learners are interested in taking baccalaureate-level work prior to the completion of high school. This segment may be interested in

getting a "jump start" on college. Their decision to purchase additional education is most often made by their parents.

7. Remediation and test prep learners are interested in learning as a prerequisite for an examination or enrolment in another programme. The decision to purchase distance education in this case often depends upon the age of the learner.

Learner characteristics, such as age, gender, attitudes and learning preferences or styles have been investigated by several researchers. Sen and Samdup (2009) and Bhushan (2008) studied the role of gender and stated that the concept of Distance Education rests on recognising the presence of multiple and varying contexts of learners, which can be addressed through responsive course content creation and delivery strategies. Based on previous research findings that identified gender to be an important factor that structures and influences the world of the learner and learner experience, a qualitative inquiry was undertaken within the constructivist framework to uncover the perspectives of learners and counsellors associated with five programmes of IGNOU Indira Gandhi National Open University (IGNOU, 2012). The findings of the study suggested that it was not gender alone, but several variables such as the structuring of the programme and its requirements, the role(s) played by the counsellors, the motivations and the learning milieu created by the learners which can impact the learner - experience and response to Open and Distance learning (ODL) both individually and collectively.

Sen and Samdup (2009) found “that there were no women- specific issues anymore-only that they need to be examined and answered within context” (p. 184). Bhushan (2008) examined the use of ICT, attitudes towards and barriers to ICT access amongst female learners in a Bachelor's Degree Programme in Computer

Application offered through distance mode by IGNOU. The researcher found that local contexts shape attitudes towards the use of technology and cause barriers to access. The researcher suggested that ICT-enabled learning should address these local context issues discussed in the paper in order to increase female participation in open and distance-learning and enable the move towards gender equality. Mitra (2009) conducted a study of the satisfaction of the students in OSI (Open Schools in India) regarding student support elements at pre-entry, start up, learning, evaluation and certification and after certification phases.

Using Rekkedal and Eriksen's importance-satisfaction model the study tried to recognise areas that are important to students as well as their degree of satisfaction with each attribute. In the study, it was found that students were generally satisfied with the support elements that they perceive to be important. A result of r=0.83 showed a strong positive linear relationship between importance and satisfaction. However, the students felt that priority needs to be given to three prime support elements in the learning phase; namely, personal contact programmes in the study centres, online tutorials and feedback on assignments. Ghosh (2001) discussed various models based on technology that have been developed at IGNOU for providing distance education in a skill-oriented discipline like library and information science (LIS). The author felt that the models selected should be based on learners' requirements, their capability, and the infrastructure available to them. Ghosh concluded that the development of multimedia and simulated courseware together with internship would produce successful LIS professionals.

Drawing from research in management communications, education, and information systems, Webster and Hackley (1997), developed an initial conceptualization of influences on technology-mediated distance-learning outcomes

relating to teaching effectiveness and of factors that may influence these outcomes. The study utilized both qualitative and quantitative techniques to examine 247 students' reactions to technology-mediated distance-learning to examine teaching effectiveness. Teaching effectiveness was conceptualized not merely in terms of student achievement, but by examining other learning outcomes such as student involvement and participation, cognitive engagement, technology self-efficacy, attitudes toward the technology employed, the usefulness of the technology, attitudes toward technology-mediated distance-learning, and the relative advantage or disadvantage of such distance-learning. Factors affecting these outcomes were classified into four categories such as technology, instructor, course, and student characteristics to develop a model for technology-mediated distance-learning (see section on Models for higher education later on). The researchers identified the following conclusions in their discussion and implications:

1. Findings of the study were that all influences on technology-mediated distance-learning outcomes related to at least three of the seven outcome variables. Perceived medium richness related to all seven outcome variables. Students' comfort with their images on the screen was found to be related to six outcomes, instructor control over the technology to five outcomes, and the quality of the technology, instructor's attitudes, and teaching style were related to four of the seven outcomes.
2. The researchers made the following observations and suggestions: ‘Thus, to the extent that instructors can exploit the full richness of the media available to them, students should experience more positive learning outcomes. Further, since medium richness is partially perceived, instructors can exhibit attitudes and behaviours that are consistent with a rich medium’ instructors

should build in opportunities for students to become comfortable with the technology employed for distance-learning, learn to control the technology, project positive attitudes, and use interactive teaching styles'. (p.1303).

3. Based on their research evidence regarding the importance of involvement and participation for technology-mediated distance-learning, the researchers provided suggestions for instructors who were using technology for the first time to promote an interactive teaching style: "Think about ways of keeping the students involved, elicit participation by using the discussion mode frequently, use the conference mode early in the term to get students introduced at all sites, and try to motivate the students to ask questions/stimulate discussion." (p.1303). In total, these results suggest that instructors need to make additional efforts to involve both local and remote students in the distance education process.

In summary, the gender of the learner, along with several other factors, play an important role in the learner experience in DE (Sen and Samdup, 2009) and local contexts shape attitudes towards the use of technology and can cause barriers to access among female learners (Bhushan, 2008). The role of gender as a barrier to online learning needs to be investigated. Furthermore it is not just focusing on gender, but it is also important to have personal contact programmes in the study centres, online tutorials and feedback on assignments. Personal contact programmes increase the level of involvement of the students, and online tutorials and feedback on assignments help in performance improvement of the student. Importance should be given to learners' requirements, their capability, and the infrastructure available. Teachers need to focus more on interactive teaching style to maximise the benefits for the students.

These areas discussed above need further research in order to enhance our knowledge about the barriers faced by the student community and the remedies that can be offered to make distance-learning more effective. Learning outcomes in technology-mediated distance-learning are influenced by technology, instructor, course, and student characteristics. Webster and Hackley (1997) in their study of teacher effectiveness of using technology to teach aspects of management, found that technology self-efficacy, attitudes toward the technology employed, the usefulness of the technology, attitudes toward technology-mediated distance-learning, and the relative advantage or disadvantage of such distance-learning were positively related to learning outcomes of a technology-mediated distance-learning programme teaching management. In a country like India, where the learner's prior experience with technology-mediated distance-learning is limited, it would be useful to study what attitudes learners have towards such an experience.

e) Research in specific Content Areas or subject

Some studies have focused on the effectiveness of distance-learning for instruction in specific subjects. Content then becomes an important variable in distance-learning. Fozdar, Kumar and Kannan (2006) undertook a study to establish the credibility of the BSc Chemistry distance-learning programme by comparing it with the conventional university programme. They also analysed the delivery system of the course for its special features and its limitations, and suggested ways to improve it based on a survey of learners' needs. The researchers collected information regarding learner's reasons for joining the BSc Chemistry programme at IGNOU, their background, profile, reason for joining BSc programme through distance mode, reason for doing a BSc major in chemistry, the availability of a computer at home or in the office, effectiveness of present mode of counselling

sessions and the views regarding web-based counselling. A sample of 200 learners was randomly selected for those who had taken the Biochemistry course as an elective. This course was generally chosen by the students who were aspiring to study for a major degree in chemistry. The questionnaires were administered by post to learners. 56 responses (28%) were received out of the 200 sent. The sample (n=56) comprised of 70% (n=40) males and 30% (n=16) females. The mean age of the sample was 21 years at the time of joining IGNOU's BSc programme. The respondents reasons for joining the distance programme were found to be to improve their job prospects (57.14%), to get a degree (57.14%), family constraints to be able to do a conventional course (17.26%), being employed (21.43%), lack of time to do a conventional course (14.29%), and not getting admission on other courses (7.14%). Of the reasons cited for studying BSc chemistry, 46.43% quoted interest in the subject, 46.43% to pursue higher studies, 42.86% for better employment prospects, and 03.57% for family pressure.

The questionnaire allowed students to select more than one reason. The researchers then set out to find reasons for the learners not turning up for the face-to–face counselling sessions. The reasons included: distance of study centre 25%, time constraint 21.43%, employment constraints 17.86%, had not received information on counselling schedules 32.14%, and further, most of the respondents asked for more counselling sessions (85.71%). Learners (n=48) showed interest in web-based counselling. From 56 respondents (60.71%) (n=34) had a computer facility and 39.29% (n=22) did not have a computer at home or at the work place. This study suggested that as the majority of the learners were working (71.43%), they had difficulty in attending face-to-face counselling sessions. On the other hand most of the learners (60.71%) had a computer facility either at home or in the workplace,

suggesting that there was a significant scope for improving counselling by using computer-aided online learning. The researchers concluded that modern educational technologies such as web based counselling could play an important role in imparting chemistry education to the BSc. students and overcome their difficulties of distance, time constraints, or employment. Furthermore, the researchers suggested that web-based learning also allowed the use of computer simulations which could be used to explain difficult concepts in chemistry and for giving demonstrations. The researchers realised that though this would not necessarily impart skills, it would definitely be able to give an exposure to the technique and method used saving the demonstration time of a counsellor. They concluded that the 'Distance between teacher and learner can be reduced by using innovative methods of teaching using modern technologies' (Fozdar et al., 2006). This study confirms the findings of some of the studies discussed earlier that there are many factors which affect the uptake or barriers to distance education.

Bhattacharya (2008) studied the initiative taken by the government and private bodies in engineering education like the National Programme on Technology Enhanced Learning (NPTEL); the use of an educational satellite called the EDUSAT; and various other approaches such as the use of "virtual classrooms" and "virtual laboratories." The paper went on to discuss some of the problem areas in the present mode of dissemination and deployment; some possible future trends and modalities are also outlined. These include blending collaborative learning with interactive technology-enhanced learning initiatives and finding ways of providing support for learners' queries. These findings also endorse the point that there are issues with the current mode of distance education and future trends like blended

education might offer solutions to these issues. Distance Learning has emerged as one of the common modes in corporate training today.

French (2006) concluded that, 'the time and cost effectiveness of distance-learning will cause it to be the preferred delivery mode of professional ethics training in the future.' (p.125). There is a growing consensus from experts in various fields who forecast that distance education will be the preferred deliver mode as it is cost effective and provides the flexibility which busy professionals require. This view is supported by Janet Grant (2011), Professor of Education in Medicine at the Open University, UK, who opines that distance education is going to be the way forward for medical education. She also claimed that these courses would be much cheaper and more flexible than conventional courses (Grant, 2011; Grant, 2012).

f) Methods used for the evaluation of distance education programmes

This section reviews the research methods which have been previously used for the evaluation of distance education programmes to inform the design of this PhD study. Evaluation of courses have been made to inform decisions about cost and funding, ensure quality and viability of the courses and their being up to date. As described above, they have involved getting information about learner characteristics, attitudes, outputs, instructor variables, technology, course design, instructional methods, student assessment and an analysis of the economics. Several of the studies discussed above and below can be classified as evaluation studies; e.g. those of Mishra and Garg (2009); Fozdar et al. (2006); Weston, Sciamanna and Nash (2008); Berman, Fall, Maloney and Levine (2008) and the methodologies used will determine the reliability and generalizability of each study. Bullock and Ory (2000), discussed methods used for evaluating the instructional methods in technology-enhanced instruction and to understand how educational interventions perform by

observing and measuring the teaching and learning process, or some small slice of it. Their paper discussed how to identify the important evaluation questions, the types of data routinely collected, and the types of problems encountered. Three conclusions were drawn from their study:

1. Multiple data collection methods have been used to collect information from multiple sources.
2. Various evaluation models or approaches have been followed.
3. There are a common set of problems and concerns about past evaluations of technology-enhanced instruction.

   Each of these conclusions is given here briefly.

- **Data Collection Methods:** Common methods used to collect student achievement data include exams and quizzes, audit trails, tracking tools, teacher and student diaries, classroom observations, videotaping, questionnaires, interviews, and focus groups (McKenna, 1995). Probably the most common approach used to collect and evaluate data has involved pre- and post-course measures of student achievement, often using classroom exams, standardized exams or both.
- **The Evaluation models/approaches** may be classified into five types: (a) Quasi-experimentation comparative evaluations; (b) goal-free evaluations; (c) illuminative evaluations (Parlett & Hamilton, 1976; Stake, 1978); (d) participatory evaluations (Cousins & Earl, 1992, Caracelli & Greene, 1997); and (e) integrative evaluation (Draper, Brown, Henderson and McAteer, 1996) as explained below:

I. Quasi-experimentation comparative evaluations compared one instructional innovation approach to another or to a traditional method of instruction.

Comparative studies are probably the most often used approach to evaluating technological innovations, and also the most often criticized (Reeves, 1994).

II. Goal-free evaluations (Stake, 1978; Parlett & Hamilton, 1976; Scriven, 1991) attempt to assess all programme impacts, both intended and unintended. Researchers investigating technological innovations often indicate their interest in learning how the innovation impacted the learning and attitudes of the students in anticipated and unanticipated ways (Knezek & Christensen, 2008; Christensen & Knezek, 2008). These involve the less formal open-ended measures (e.g., personal observation, focus groups, and interviews with open-ended questions).

III. Illuminative evaluations involve the use of observations, interviews with participants, questionnaires, and document analysis to "illuminate" or reveal problems, issues, and concerns using qualitative data analytic techniques. This approach was most commonly used to describe and interpret the impact of the technology, with less concern for actually measuring impact (Oliver, 2000, Oliver, 1997).

IV. Participatory evaluations (Caracelli and Greene, 1997; Cousins and Earl, 1992) involve a partnership between trained evaluation personnel and the different evaluation audiences. The review identified several studies in which the conduct of the evaluation was a collaborative effort among the evaluators, teachers, students, and developers. This has particular significance for evaluators working with those who design instructional technologies as well as for those who use them to teach (Draper et al., 1996).

V. Integrative evaluation (Draper et al., 1996) is aimed at improving teaching and learning by integrating CAL (computer assisted learning) material into

the overall situation more effectively. Draper and his colleagues explain that: "Integrative evaluation is not primarily either formative or summative of the software, because what is both measured and modified is most often not the software but surrounding materials and activities. It is not merely reporting measurements as summative evaluation is, because it typically leads to immediate action in the form of changes. It could therefore be called formative evaluation of the overall teaching situation, but we call it integrative to suggest the nature of the changes it leads to". (ibid. p. 163)

VI. The third conclusion that the researchers drew from their review was that these 'technology impact studies' have identified a common set of problems and concerns about the evaluations. These were general concerns that quantitative studies fail to explain why anything happened and qualitative studies have difficulty establishing general results. Oliver (1997) suggests that most of the critics of technology impact studies advocated a "hybrid approach" to evaluation. In the latter half of their study, Bullock and Ory (2000) presented their experiences evaluating a campus-wide learning technology effort (the SCALE Project); an evaluation that spanned three years, used multiple methods, and provided some interesting challenges. This example of SCALE project was presented to provide information to help others conduct evaluations of the use of learning technologies in higher education classrooms. The paper about SCALE was mentioned in the Frontiers in Education Conference, 1997, 27th Annual Conference - Teaching and Learning in Era of Change. This experiment revealed some very successful, and not so successful, classroom implementations of ALN [Asynchronous Learning Network] technologies. Many of the SCALE-

supported courses showed evidence of student and instructor use of and satisfaction with ALN. There was also some evidence that ALN helped to increase student learning and could be used to reduce campus instructional costs. Budget savings occurred by using ALN to support the teaching of larger course sections, or to reduce the number of instructional staff, or both.

1. ***Survey methods:*** Survey methods are one of the most common methods of data collection in distance education. Relevant research studies where surveys were used are discussed below.

A. Fozdar, Kumar and Kannan (2006) conducted a survey to analyse the weaknesses in the present delivery system of the BSc chemistry programme of IGNOU and to suggest some new approaches to make chemistry courses more effective, collecting information about learner attitudes, difficulties and preferences, (Fozdar and Kumar, 2007, Killedar, 2008) before implementing a new technology in DE. The survey method used by Fozdar and Kumar is of particular interest to this PhD study as it studied students' perceptions and attitudes to mobile learning before actually implementing the technology within a bachelor in Chemistry distance-learning programme. Surveys may also be used to evaluate the success of ongoing projects to get information about learner satisfaction, teacher/instructor characteristics, and use of technology, success of delivery technology or all of the above.

B. Uzunboylu, Cavus, and Ercag (2009), conducted a survey using a questionnaire for collecting information regarding "usefulness of mobile learning systems" from a sample of 20 male and 21 female undergraduates enrolled in computer education and instructional technologies classes at the Near East University in North Cyprus. Students voluntarily participated in a

six-week programme using mobile telephones to transmit photographs of local environmental blights and to exchange pictures and observations. Participants learned ways to maintain clean environments and increase their awareness of environmental concerns. Responses to the questionnaire differed significantly based upon gender and grade. Here also a survey formed an important tool to collect data and it has been a significant study method in distance education.

C. Some studies involve extensive data collection: e.g. interview techniques over several projects like PANdora 2005-2008 (Distance Education Technology in Asia, 2009) or over several years (evaluation models, Bullock and Ory, 2000). The method of research is based on the goals of the research and in the above case; it was to share knowledge of ICT use, its drawbacks and effectiveness for providing DE.

D. Killedar's (2008) discussion on questionnaire construction and administration is of particular significance to this PhD study. This study was also designed to provide an insight for the designers and developers of an "Open and Distance Learning System".

2. Case Studies:

Case studies are also an important research method to provide qualitative information about specific projects/institutions. Duncan (2005) conducted a case study to explore an instructor's and graduate students' reactions to their first on-line course. This was a case study of a master's level online education course "Curriculum for Rural, Northern and Aboriginal Schools" that utilized WebCT2 as a course delivery platform. The researcher adopted this research method in order to conduct a holistic, in-depth investigation into the experience of participants in an

online course listening to the voices of instructor and learners concurrently. The researcher used a qualitative method of study and accordingly collected data from multiple electronic sources as well as from final face-to-face semi-structured individual interviews. The researcher found that discussion boards, email transcripts, journals, and interviews provided a rich source of qualitative data. The researcher says that these data sources indicated as to who was interacting, who was supporting, who was sharing knowledge, and providing a route for interaction, reflection, and interpretation which occured between participants and the researcher. The findings of the study showed how working professionals prioritised the learning time they had available and that as adult learners, this online experience was made meaningful not only by its convenience and flexibility but, more importantly, through the opportunity to engage with content, to increase technological skills, and to reflect and dialogue with peers on issues and concerns that were relevant to their professional lives. The researcher however, found that for the instructor of the course the experience was not positive. This finding, the researcher says, has implications for on-going staff development needs and technology support as more universities and departments offer Internet-based education.

3. Ethnography and Folklore studies:

Freisen (2005) reviewed the work of Haythornthwaite and Kazmer (2004), which is a collection of papers authored by Winograd and Flores, Foucault, Agre, Bakhtin and others, some of which used ethnographic and folklore study approaches to research distance education. The papers are used within the Master's Level Library Experimental Education Programme (LEEP) at the Graduate School of Library and Information Sciences, University of Illinois at Urbana-Champaign. While one chapter by the authors describes online environments as providing

separate spheres of activity and community that are in many ways comparable to the 'worlds' of work, home and school, other chapters build upon work that these two researchers have undertaken over the last few years in developing the LEEP program. The authors tie experience from the LEEP programme to the research framework developed in their previous research where they identified the concept of 'three radicals of presentation in persistent conversation': 'visibility,' 'relation' and 'co-presence'. The use of methodologies such as ethnography is meaningful in providing an in depth understanding of such concepts relevant to the online community not revealed by survey methods.

4. Pre-test Post-Test Design:

Harris (J.M.), Salasche and Harris (R.B.) (2001), conducted a study of 150 National Health Services (NHS) practitioners in the UK which involved using an online interactive programme previously found successful in the US, to improve physician's abilities to diagnose and manage pigmented skin lesions. The researchers found that doctors showed significant improvement in knowledge and felt more confident in their abilities to manage pigmented skin lesions after interacting with the online programme. They also showed an average score of 3.83 on a four-point scale for overall assessment of the course (1 =very unfavourable, 4 = very favourable). The above four methods can be used individually or in combination to obtain data to evaluate any distance education programme. They will enable the researcher to collect, utilize, represent, and provide outcomes from the study. This in turn will help better understanding of the selected subject. It will also enable decisions to be made about cost and funding, ensure quality and viability of the courses and their being up to date.

g) Quality Assurance in Distance Education

Quality assurance of any programme is of primary importance for DE to be successful. Although researchers like Bullock and Ory (2000) have focussed on the various methods which can be used for evaluating distance-learning programmes, Stella and Gnanam (2004) were concerned about quality assurance assessment of distance education programmes. They claimed that the procedures and criteria used in distance education need to be different from the procedures used for traditional on-campus courses. Some of the issues they dealt with were how 'quality' may be defined and whether criteria used for assessing quality for traditional educational institutions/universities can also be applied to DE. They reviewed the benchmarks developed by different organizations. The Council of Higher Education Accreditation (CHEA, 2014) and Commonwealth Higher Education Management Service (ibid.) have designed and tested an alternative approach that places significant emphasis on student outcomes and delivery via distance education. The competency standards were organized in three main areas of institutional performance: Student outcomes and attainment, responsiveness to students, and organizational alignment and support. The focus of Student Outcomes and Attainment was to see how the institution's graduates met clear standards of achievement demonstrable through explicit assessments of performance.

The researchers argued that even if the quality assurance agency believed in using the same criteria applicable for traditional institutions, as in the case of India, due consideration of the unique characteristics of distance education was essential. In such instances, more fine-tuning was needed for implementation of the process. For example, contextualising aspects like the "adequacy of infrastructure"; "quality

of learning resources" and "effective management of support services" need clear guidelines for those involved in the assessment process. The UK Quality code for higher education has been developed with the consultation of the higher education sector to assure the standards and quality of UK higher education (QAA, 2016). It defines the standards and quality in terms of a threshold academic standard, along with how well the provider supports the student in order to attain the award and a quality assurance process to check that the standards are being maintained. Organisations legally entitled to award degrees are ultimately responsible for the standards and quality. The quality code, reviewed by the Quality Assurance Agency, sets out the formal expectations that all UK higher education providers are required to meet.

2.1.5 Distance Education in Developing Countries

Distance education is now used in a wide variety of settings and for a broad range of purposes. It is gaining popularity due to two reasons; firstly, it offers economic advantage and secondly, new breakthroughs in technologies facilitate more penetration. Developing nations are aiming to embrace the advantages distance education brings and the solution it offers in solving economic constrains (Alvarez et al., 1998, Potashnik and Capper, 1998). More than 30 years ago, Crooks (1983) identified the need for distance education in developing countries and cautioned that while distance-learning had the potential to solve a number of problems faced by these countries it was not enough if DE simply catered for higher education alone in those countries but it should also cater for adult education and benefit those who cannot go to school. Discussing various issues, which must be considered while designing DE courses for developing countries, he considered cost effectiveness as the most important factor. Drop out was also a serious issue in DE and because it

could affect the cost effectiveness of a course. He suggested the following measures to make communication effective to keep the student motivation in DE high. This could be done by considering the following points:

1. Teaching materials must be acceptable educationally, i.e. free from inaccuracy, bias, over-simplification and ambiguity, as well as balanced between the imparting of facts and developing the skills necessary to use them. Obviously these points apply to conventional teaching also but they are most important in distance-learning where a student may not have the opportunity to discuss their study-materials with a teacher or other students.
2. They must take into account a student's resources and abilities including the time they have available for study, and their likely relevant prior knowledge and skills.
3. They must be self-instructional, written in a stimulating style with a clear and evident structure, attractively presented so as to permit study under potentially difficult circumstances, and as far as possible allow for student differences in learning pace, interests and style.
4. They must be allied to a responsive overall system of evaluation and feedback, which will facilitate either amendment or enhancement of teaching materials where necessary and provide individual help to students with learning or study difficulties.
5. Apart from these, he also listed cost of producing quality materials, language, practical difficulties like delays in the postal system, lack of familiarity with the culture of the group for the course writers, political considerations etc. as factors especially in developing countries.

India, being a developing country with good connectivity in terms of post and Internet, offers a fertile bed for researchers to study distance education. One such study was conducted by Fozdar and Kumar (2007). They investigated students' attitudes and perceptions towards the effectiveness of mobile learning to determine how this technology could be optimally used to improve student retention in the BSc Programmes at IGNOU. The researchers prepared a 33-item questionnaire using a Likert scale from 1 to 5 (criteria ranging from strongly agree to strongly disagree) and administered it to 100 BSc students enrolled in IGNOU. 65% of the students responded to the item 'strongly agree' supporting mobile learning as an effective method for learning. Respondents were also asked to give their preferences for where mobile learning could be effectively used in their BSc programme. The results showed that students believed mobile technologies to be more flexible, enabling them greater freedom to learn at any place and at anytime. For the question on the availability of mobiles, the respondents did not agree with the suggestion that mobiles were unavailable to a large number of them or that the cost involved in owning and using mobile devices would be high. The results also indicated that the students preferred mobile devices as effective tools for providing short information, such as receiving feedbacks on assignments, information regarding important dates, schedules of counselling and laboratory sessions and grades and examination results. However, 35.4% of the respondents indicated that receiving their study guides on mobile devices was not desirable. Most of the respondents also indicated that they were comfortable with the Short Messaging Service (SMS) format while only a few, 20.5%, indicated that they could Web-browse on their mobile devices. The researchers also investigated whether mobile devices could be used effectively to overcome dropout rates in the BSc programme by fulfilling some of the needs

expressed by drop-out students. They concluded that mobile phones being ubiquitous provide a viable platform for collaboration and interaction increasing feelings of connectedness and community that are characteristics of a conventional course in higher education.

Along similar lines, several other studies have been undertaken by various scholars to evaluate courses in India as mentioned earlier. Mishra, Kapoor and Singh (2009) and Nigam and Joshi (2007) collected students' reasons for drop-out; Fozdar et al. (2006) identified research areas in DE; Passi and Mishra (2004) and Mishra et al., (2009) presented an overview of E-learning in India. They described the historical developments of E-learning and identified major stakeholders and institutions that have initiated E-learning programmes after the creation of the National Task Force on Information Technology and Software Development constituted by the Prime Minister of India in 1998. National level initiatives of the University Grants Commission (UGC) and the Ministry of Human Resource Development (MHRD), Government of India to promote E-learning in the country were highlighted. Based on the critical analysis and reflections on existing practices, the authors recommended the establishment of a statutory body for E-learning. Other recommendations included the development of learning objects, repository, a consortia approach to E-learning programme delivery, and the training of teachers to improve the present situation.

In developing countries, the challenge of making DE more accessible and user-friendly lies in understanding and overcoming technological barriers such as webpage loading time which has been found to be linked to the complexity of the Internet routes between Web users and the host server. Baggaley et al., (2007; 2009) conducted two studies of 12 Asian countries involved in the PANdora project. In the

first study, the web browser loading times were measured in 12 Asian countries, and were found to be up to four times slower than commonly prescribed as acceptable. Failure of web pages to load at all was also frequent. The second follow-up study compared these loading times with the complexity of the Internet routes linking the Web users and the Web servers hosting them. The study was conducted in the same 12 Asian countries, with additional data for the follow-up study being collected in China. Using a "trace route" routine, the study indicated that webpage loading time was linked to the complexity of the Internet routes between Web users and the host server. These studies show how the selection of technology for delivery systems becomes one of the important factors in sustaining learner interest and motivation in a distance-learning system.

Furthermore, this research has shown that course providers, especially those in developed nations must evaluate these factors before implementing a course in a developing country. Stella and Gnanam (2004) raised several important issues such as the applicability of quality assessment to distance education and how to coordinate the quality assurance activities at the international level as distance education provision crosses national borders. They concluded that it was doubtful that the philosophy, principles and standards routinely applied to evaluate or accredit traditional courses and programmes could be used without significant modifications to assess the quality and effectiveness of distance education because the concepts and processes being learnt will be influenced by the educational medium used. They proposed that the solution would lie in pooling the knowledge and resources together to identify better ways of assessing distance education, without losing sight of its distinct characteristics.

In summary, DE is the in-thing in developing countries and various new technologies are being explored. The above studies show that although a lot of progress has been made in the field of distance education, there are still many barriers. Slow Internet speed and lack of access are still important barriers to distance education in developing countries. Distance learning offers learners opportunities to take courses from different countries, but quality assurance needs focus. Crooks (1983) suggested that course designers must take into account a student's resources and abilities while designing courses for developing countries. On similar lines, it would be useful to study student attitudes and barriers to online learning, especially in continuing professional development in a developing country like India.

2.1.6 Blended Learning

As explained earlier, the term 'blended learning' refers to a solution that combines different delivery methods (Valiathan, 2002). It is the use of two or more distinct methods of training. This may include combinations such as: blending classroom instruction with online instruction, blending online instruction with access to a coach or faculty member, blending simulations with structured courses, blending on-the-job training with brownbag informal sessions, or blending managerial coaching with e-learning activities (Clark, 2003, Friesen, 2005). The American Society for Training and Development identified blended learning as one of the top ten trends to emerge in the knowledge delivery industry (Graham, 2006). In other words, blended learning courses, which include online elements, are neither completely on-site nor online but have a mix of the two components with a range of delivery methods within these. With increasing competition in the education market, there is a growing demand for courses that provide greater flexibility for the learner.

Therefore, there has been a concerted effort on the part of several universities to offer distance courses in a blended format. Even small colleges have made attempts at revamping their courses by converting face-to-face courses into hybrid/blended courses (Burrell-Ihlow, 2009).

The author, Burrell-Ihlow (2009) discusses and analyzes the feasibility of creating and offering blended courses with typical face-to-face courses and fully online courses by using an instructional design model. While blended learning is becoming a viable option for course providers and students, studies are being undertaken to test its feasibility and compare it with on-campus courses. Stella and Gnanam (2004), list a whole variety of forms that technology assisted learning has opened up in the past two decades. They discuss how the convergence of forms of learning has led to the concept of 'distributed learning'. They say 'with online delivery systems and approaches being employed for both distant and on-campus students, Distance Education and on-campus instruction are converging. Today, on-campus students can take part in the programme or courses through online or E-learning, either in the campus or away from the campus and this combination has narrowed down the gap between the on-and off-campus students. This convergence has resulted in the use of the more broad-based term 'distributed learning''. When student achievement was considered as the parameter to evaluate effectiveness, Limniou et al., (2009), found no difference in student achievement between blended learning and face-to-face interaction. They investigated the effect of two different teaching approaches in supporting a pre-laboratory session in chemistry using the same software. An investigation conducted in Greece used the computer cluster where the students had face- to-face interaction with the teachers.

A computer cluster is a group of linked computers, working together closely thus in many respects forming a classroom of computers. The second approach, which was conducted in the UK, used the involvement and participation in an online Web CT course with asynchronous online discussion. The researchers found that the simulation programme in the two different pre-laboratory training sessions gave the same learning outcome; however, the learning characteristics and the teacher's effort were different. In both cases after their pre-laboratory training session, students entered the laboratory performing experiments without any further instructions. In relation to the teacher's role, they were different in the two approaches. In the computer cluster, the role adopted by the teacher was more active and in the Web CT method, the teacher performed the role of a facilitator. This study focused more on one-dimensional value like student achievement and did not go into depth regarding the dynamics of learning and the assimilation process. It did not consider factors such as motivation, methodology and delivery, supportive interventions, and role of peers. The study itself raises lot of questions. It is not known whether it was fair to compare students of Greece and students in UK.

The knowledge base, previous exposure to study subject, ease with using technology, and availability of technology are different in both the nations. Also teachers played one particular type of role in the two approaches and no attempt was made to reverse the role of computer cluster/ WebCT and teachers. Sloman (2007) considered blended learning in the global context using research surveys supplemented by extensive case study interviews involving 19 countries. The author opines that it was beyond doubt that the concept of blended learning had arrived and is here to stay. He felt that: if blended learning were to add value to our understanding of effective training and learning, then the term needs to be

considered in a broader context. It was not simply about delivery and technology. Blended learning must include varying learning methodology and training delivery, learner motivations, what support systems they need and how these supportive interventions can take place in practice must be considered in order to get the 'blend' right.

Fillion, Limayem, Laferriere and Mantha (2009) conducted a study to investigate the points of view of onsite professors (hybrid or blended mode) and of those teaching the same courses using the Internet (online mode). They developed a moderator–type theoretical research model to guide the whole study and tested it in a field experiment in Canada. They used a multi-method approach that consisted of a web survey involving open and closed ended questions and a structured interview. The sample consisted of 313 onsite and online students from eight undergraduate and graduate courses offered at the 'Faculty of Administration' of a large Canadian university as well as 16 onsite and online professors teaching these students. The quantitative data analysis was performed using a structural equation modelling software package, that is, Partial Least Squares (PLS). The qualitative data were analyzed following a thematic structure using QSR NVivo [Qualitative Data Analysis with NVivo software developed by QSR International]. The researcher presented a summary of the quantitative results from the responses to closed-ended questions, obtained from students and qualitative results obtained from professors through structured interviews.

The quantitative results from this study found that:

- Onsite students did not find learning to be more effective than their online peers.
- Onsite students performed better than those online.

- Online students were more satisfied.
- Students' autonomy had an influence on the relation between the hybrid and online mode and the effectiveness of their learning, and this influence was more pronounced for online students.

The qualitative results for this study related to professors and showed that:

- ICT improved professors' teaching and students learning.
- Satisfaction was high with the use of ICT for teaching.
- ICT can be used by professors to organise themselves and their teaching.
- Onsite presence of students still an advantage while using ICT
- ICT enables prompt feedback.
- ICT increases levels of student motivation and participation

Bhattacharya and Sharma (2007) conducted a comprehensive environmental scanning of various E-learning experiments, tools, projects to facilitate E-learning and described the contemporary situation in India with regard to education especially E-learning. The authors found that models of E-learning which exclude any face-to-face contact may have limited prospects, but blended learning offers significant potential both on and off campus and should be pursued if the benefits of E-learning are to be fully realized. They concluded that there is no doubt there are certain areas which need to be worked upon for the successful implementation of E-learning which need to include face-to-face sessions perceived to be beneficial to students by their survey results. They claimed that there is a need to become more customer-centred and take a lesson from businesses which regard the customer to be the 'king'. They emphasised that focusing on blended learning, rather than insisting on teaching students at faculty's place and pace using an industrial model which was now becoming obsolete could be beneficial to the learners. Furthermore, they

concluded that universities needed to have an edge in their competitive advantage in terms of the ICT revolution and the new model of E-learning must be relied upon in the future.

The above discussions raise certain unanswered questions.

Limniou, Papadopoulous and Whitehead (2009) discussed blended learning only from the achievement point of view and did not consider motivation factors. Sloman (2007) took into account student motivation, but did not consider instructor motivation. Fillion et al., (2009) made an effort to obtain the point of view of onsite and online professors but not the opinions of the students. Bhattacharya and Sharma (2007) stressed the need to explore blended learning potential in India. However, if blended learning and distance education are to be successful there is a need to identify the needs, perceptions, and motivations of potential learners in blended learning system. With blended learning emerging as a powerful medium of delivery for higher education in the 21st century, it is important to understand comprehensively the elements considered important in blending learning including the current trends and issues. A growing use of blended learning and distance education in India is to provide continuing professional development in the field of dentistry, which is a highly technical subject, for those not able to attend full time face-to-face courses.

With practising dentists facing issues of time, space, and money coupled with the importance of keeping pace with the latest developments in the field of dentistry, blended learning offers a viable alternative to traditional education, especially in India, the context for this PhD study. India is the seventh largest country in the world with varied topography whilst being a hub of information technology and the knowledge revolution. With a large pool of professionally qualified dentists who

wish to constantly update themselves with the latest in the subject using technology, there is the need to identify what factors enable them to improve their knowledge and professional practice through distance education and what are the barriers to their involvement.

2.1.7 Conclusions

The first part of the literature review provided an historical background to the development, application, review, and effectiveness of distance education not only in the west, but also in developing nations. This chapter has shown that online learning as a mode of delivery of distance education courses is gaining momentum in India which is the region chosen for this study. Questions of our concern are ways to overcome technological barriers, develop relevant learning material, reduce drop-out rates, assure quality control and assess instructor and learner readiness for technology-mediated distance education. In developing countries where distance education is trying to meet the needs of millions, online learning is also seen as a big boom opportunity with many promises of things to come. Not only local universities and colleges, but also big corporate bodies, international training organisations and foreign universities are offering their courses to students in India. Course designers from foreign universities need to take into account learner attitudes to online learning and understand what they perceive as barriers to learning before starting a course. While online learning has been found to be a viable and hugely successful mode for Continuing Professional development in the West, the idea is still gaining momentum in developing countries where the focus is still on providing undergraduate/post-graduate courses of higher education. According to an analysis of CPD for medical professionals, conducted by Gaspard, Schostak (J) and Schostak (J. R) (2011), the cost of courses, distance and lack of time play vital roles in the

uptake of regular courses for professional development. Online courses using the blended format seem to offer a viable solution to problems. Based on the review conducted so far, it can be concluded that a study to determine the attitudes and perceived barriers to online learning in continuing professional development in

2.2 Continuing challenges faced by the health professional

Much of the literature reviewed above reports on research into the effectiveness of a range of distance education programmes for CDP. In the last decade there have been an increasing number of studies into distance learning in the Health Care professions particularly relevant to the research reported in this thesis. For example, Cote (2007) undertook a survey to study the educational experiences, needs, preferred methods of professional development and technological profile of family physicians and nurses. Although this study was conducted in British Columbia, the research findings are also of relevance to other countries and different health care professionals such as dentists because the approach to the delivery of professional development covers a similar range of methods. She views the provision of health care as a dynamic and evolving industry and therefore the providers' roles, responsibilities and patterns of delivery are changing as a result of this demand. Romanow (2002) has argued that the current situation in Canada is serious and requires national solutions to address challenges in recruitment, training and the retention of health care professionals. A provincial report from Alberta has also stated that in order to incorporate 'evidence-based' research into day-to-day practice, health care practitioners require flexibility, opportunity and access to better information (Mazankowski, 2001).

Mechanic (2003) refers to physicians feeling as if they were on a 'treadmill' as a consequence of the demand and expectations put upon them to be

knowledgeable about an array of topics and developing techniques. There is also a requirement from regulatory bodies for continuing professional development. Continuing medical education is seen "as evidence of competence for medical practice when granting medical re-licensure, hospital privileges, specialty recertification, professional society membership, and recognition for selected other professional activities" (Bennett et al. 2000, p 1168). These issues are also representative of the dental profession because there are many similar requirements for theoretical and practical medical skills training across all the Health Care professions. Griscti & Jacono (2006) concluded from their literature review, for continuing education programmes for nurses to be effective, they need to be attainable and realistic.

2.3 Provision of continuing professional development via traditional methods

In a study conducted by Ebell and Shaughnessy (2003) into the connection between the needs of the professional and the context in which they are learning, they found that "Traditional continuing medical education (CME) has been disconnected from the actual practice of medicine and has not focused on providing the most useful information in the most efficient way" (p. S53). They argue that the goal for continuing medical education should not be just to increase knowledge but also to improve patient outcomes via initiating behavioural changes in the physician. They concluded that learning occurs when the need and the control over the information required is achieved. This supports the theory of planned behaviour as stated by Ajzen (1991) in which the extent of control the learner perceives he or she has of the experience will affect the willingness to engage in the learning activity. With the advent of the hand held computer and World Wide Web these authors

propose that there is an opportunity to develop new methods and opportunities to provide continuing medical education which will address the need for learning to be contextualised "providing opportunities for learning of a type that can be used by the reflective practitioner during his or her day-to-day activities."(p. S61)

In a questionnaire-based study, Bennett et al. (2006) noted that physicians do not yet use access to Internet information to solve difficult problems but rely on consultations with colleagues. They do recommend that professionals in continuing medical education must learn to identify the trusted Internet sites and search engines. This would indicate that although the Internet based programmes have a definite potential, continued face-to-face encounters are also desirable.

In her study discussed above, Cote (2007) found that family physicians had more access to portable devices such as laptops and personal digital devices and therefore opined that this must be considered when designing programmes for this group. This will also be valid for dentists.

An imperfect evidence base for decision makers involved in continuing medical education has been identified by Grimshaw, Eccles & Tetroe (2004). They found that in studies of continuing education of healthcare professionals conducted in the United States, Netherlands, Britain, Canada and Australia, 30-40% of patients do not get effective treatment and that 25% of patients receive care, which is either unnecessary or even harmful (p. S31). Therefore the need for an effective educational delivery mechanism for professional health care workers is necessary in order to improve the standards of patient treatment. Grimshaw et al. (2004) made a positive conclusion from their review that it is possible to change professional behaviour and that "future research in this area should focus on developing a better theoretical understanding of health care professional and organizational behavior

change so that researchers can identify modifiable and non-modifiable factors. This would be complemented by the development of practical methods of identifying barriers and facilitators to change. This, in turn, would allow better estimates of the effectiveness and efficiency of dissemination and implementation strategies in the presence of different barriers and facilitators" (p. S36). This has been one of the purposes of the research reported in this PhD thesis.

In a study conducted by Dee and Stanley (2005), their findings indicated a need for more training in database training and computer skills for the participants of their study who were nursing students and clinical nurses. This concurs with similar findings by Mamary and Charles (2000, 2003)/Charles and Mamary (2002) in a series of studies of the barriers to physicians take up of computer based CPD and self directed learning in medical education. They found that the main reasons for medical professionals not using computer-based continuing education were the physicians' preference for in-person instruction and not knowing how to use computer based technologies. This would indicate that while it is desirable to include computer-based skills in the delivery of effective continuing education programmes alongside it, training in the necessary skills need to be considered for the professional development of health care professionals which would equally apply to professional dentists.

2.4 Factors to consider for Continuing Professional Development

As the need for continuing professional development has been acknowledged by various workers as discussed previously, various factors have been shown to influence the delivery of programmes to enable effective learning outcomes. Cote (2007) has described knowledge translation and continuing professional development courses and the Internet as new approaches to continuing professional

development. Ho (2004) opines that physicians who are judicious about information will rely heavily on information and communication technologies, on demand and E-health is attractive to health professionals.

A global crisis of a shortage of health professionals which is exacerbated by the transitions of demographic changes, epidemiologic shifts and the redistribution of disability burden has been identified by Crisp and Chen (2014). They have suggested that there is a need for change in health care systems, roles of the professionals and professional education. They found that the doctor and nurse ratio per 1000 population is the lowest in India (data from the World Health Organization) and this would also be reflective of the dentist to population ratio there. They refer to a "flipped classroom" where the sequence of lecture and homework is reversed and information technology based mass online courses can expand with opportunities for new approaches to teaching. A clear association between government influenced educational deliveries can be identified.

An online based bioterrorism course showed promise as an educational intervention in preparing practising physicians to better diagnose emerging rare infections and also an increase in confidence and reporting (Casebeer, Bennett, Kristofco, Carillo & Centor, 2002). They also comment that the Internet offers unique capabilities to teach those with access anytime, anywhere and that it is the first educational distribution system to reach a geographically disparate audience rapidly and simultaneously. This is particularly relevant for a country like India.

The scope and role of continuing education were explored by Daley (1997). She implies that rather than just being a vehicle for information in the clinical practice of nurses, it also has an important role of facilitating a process of learning, reflection, growth and change. Ousey and Roberts (2013), who studied the access

and uptake of nurses for professional development found that qualified nurses want to access courses however barriers exist which prevent them being released for such courses from their work schedule. They encouraged education providers to consider developing non-traditional study packages including online provision. This solution would also be applicable to dentists who may find it difficult to get time off for study as well as the financial implications of time away from their practices.

In order to improve the approaches to continuing professional development for health care professionals Cote (2007) has described knowledge translation and the use of Internet based technologies. As health professionals dentists would also benefit from these approaches.

2.4.1 Knowledge Translation

In order for effective continuing development for dentists there will need to be the translation of knowledge from the educator to the learner. Cote (2007) has mentioned that this is gaining prominence in the training of those involved in the health care field. This has been described to include exchange, synthesis and application of knowledge which is ethical within interactions between researchers and users to enable the benefits of the research to produce improved health and effective services and products with the ultimate aim to strengthen the health care system (Canadian Institute for Health Research, 2006). Dental educators and trainers will need to consider new techniques and materials as they are being developed and become available and this framework for designing education and training would prove relevant. Its relevance for providing better outcomes for patients has also been mentioned by others (e.g. Ho, 2004, Bozkurt et al., 2015).

2.4.2 Continuing Professional Development Courses and the Internet

A questionnaire based quantitative research study done by Cote (2007) focussing on two groups; family physicians and nurses in British Columbia concluded that:

- Both groups had access to computers and the Internet.

- Both used computers and the Internet on average 10 hours per week.

However the two groups used computers differently with physicians using laptops and personal digital assistants more.

In my research the accessibility and amount of time spent was also investigated. The pattern of use of laptops and personal digital assistants by dentists is likely to be similar to physicians as found in Cote's study.

In a literature review by Cobb (2004) which examined 76 articles relating to web based learning for medical, nursing and dental professionals, they found that web based learning was effective but not superior to traditional methods in areas of learning and satisfaction and also a fast Internet speed was as important as content. They also concluded that Internet based continuing education can be as effective as traditional methods however barriers to Internet based continuing education exist and may be on the increase.

These studies show that although there are benefits to continuing professional development with the use of computers and the Internet the barriers need to be clearly identified in order to make effective use of these valuable technologies.

2.4.3 Knowledge Production and Utilization

The wider literature review has shown that dentists can pursue continuing professional development via live conferences, events and workshops, reading journals and attending courses. Cote (2007), in her study of family physicians and nurses, concluded that live conferences, workshops, events and courses remained the first choice of family physicians. She also mentions that print resources would still remain popular. She concluded that the development of hybrid options which combine live, print and online initiatives would need to be further researched and investigated.

Dentistry, being a practical subject like nursing, would require hands on and face-to-face encounters with either patients or simulation exercises on models and phantom heads. Therefore, having a 'blended' approach to course delivery would be beneficial for the students who embark in professional development programmes. In this research the need for a practical element for effective delivery of a programme was investigated.

2.4.4 Gaining Professional Practice Knowledge through Reflective Professional Practice

In a systematic review conducted by Mann, Gordon and MacLeod (2009), the importance of reflection and reflective practice were investigated in health professionals' education. They noted in their review that reflection and reflective practice were mentioned as essential attributes in general education literature. They used three definitions of reflection to guide their review in order to include the nature of the reflective activity and its translation into professional practice and concluded that all the definitions emphasised critical analysis of knowledge and

experience. They reviewed the models described by various authors and the two major dimensions to the models of reflection they reviewed were:

1. An iterative dimension in which reflection was triggered by experience to produce a new understanding, and
2. A vertical dimension that looked at different levels.

The authors reviewed 29 research studies with various types: Qualitative; Observational; Quasi-experimental and mixed methods. The studies were from several different journals relating to nursing, medicine and others health care related courses and were located in several (11) different countries around the world. Although none of the studies specifically mentioned dentists, being related in this area certain inferences can be drawn. A summary of their findings were that:

- reflection enables learning from experience;
- it does not happen in all situations however notably stimulated by complex clinical problems;
- In practising professionals reflection appears to be multi-factorial.

Aspects of Schon's 1983 model (reviewed by Mann et al., 2009) were clearly evident of the iterative models. The importance of reflection and reflective practice in the learning process were acknowledged by the authors. However, their review indicated that the assumption from previous literature reports that reflection will enhance competency could not be supported or refuted by the literature which they reviewed. They did propose however that continued study on reflection and its effects on professionals and professional practice in the health sector is important, and practitioners reflect in different ways.

To enable the dentists to provide continuing competent health care and gain competency in their field of interest would mean that the process of continuing professional development would need to include elements of reflective practice during the learning process.

2.4.5 Choosing a Learning Method

In this research I have sought to investigate the factors and barriers, which would influence the uptake of continuing professional development through distance-learning for dentists. As a practical subject requiring specific clinical skills the need for inclusion of a practical component was investigated. Logan (2014), who studied the beliefs of nurse educators, commented upon a hybrid course where an E-learning module was paired with a live workshop. A module 'Living with cancer of the urinary tract' was developed to be delivered in a 'blended learning' approach by Dowling, Power and O'Boyle (2012). The module had 5 online study units along with a face-to-workshop in college. The authors commented that blended learning encourages students to engage with one another. Although some challenges were identified the authors concluded that blended learning was a creative and sustainable way of the delivery of continuing education.

2.4.6 Barriers to E-Learning

In this section, research findings are presented with regard to barriers to E-learning. Barriers to E-learning or online learning are generally of interest to researchers who are seeking to understand drop-out rates/success rates of courses or design new courses. One of the main aims of the current study was to determine students' perceived barriers to continuing professional development courses in clinical dentistry. The literature survey has also covered research conducted in various settings offering online or programmes for graduate, undergraduate courses,

campus-based or otherwise, and courses designed for adults or for continuing professional development.

Chengfeng (2003) conducted a literature review and analysis of barriers to E-learning and classified them into four areas namely: (i) learners: the financial barrier, student motivation, control over learning activities, loneliness due to separation from other students and a lack of a feeling of belonging, inadequate skills and experience in distance-learning, and insufficient computer skills; (2) teachers: inadequate understanding of what constitutes E-learning and what learners need, a lack of training and E-learning professionals; (3) curriculum: ambiguity, poor quality, problems in accessing E-learning resources, insufficient evaluation; and (4) e-school: organizational and structural factors.

Lee (2000) lists the barriers in a computer-assisted language learning environment into the following categories: financial barriers, availability of computer hardware and software, technical and theoretical knowledge and acceptance of the technology. Gagnon et al. (2007) found that lack of time, lack of computer knowledge and skills and social factors to a certain extent are the factors that affect the completion of an online programme on Evidence Based Medicine (EBM) by the Continuing Professional Development for physicians. Berge (1998) conducted a survey of barriers faced by teachers in an online environment and listed the following: "faceless" teaching, fear of the imminent replacement of faculty by computers, diffusion of value traditionally placed on getting a degree, faculty culture, lack of an adequate time-frame to implement online courses, independent learning skills and local library resources, lack of formalized agreements to sustain programme commitment through difficulties and problems, high cost of materials, taxpayer ignorance of the efficacy of distance education; lack of a national agenda,

funding priority, and policy leadership; increased time required for both online contacts and preparation of materials/activities; the more technologically advanced the learning system was, the more things could go wrong; non-educational considerations take precedence over educational priorities; resistance to change; and lack of technological assistance.

Simmons (2002), identified the following barriers out of the Forum Corporation study of 144 US based companies: time employees have for training/learning, cost versus value, difficulty in measuring results, quality of learning content, perceived difficulty of using such a system, technology infrastructure, internal resistance to using technology instead of face-to-face learning. From the review of the studies above it is clear that student-related barriers invariably constitute a significant proportion of the barriers. The student barriers such as time (Gagnon et al., 2007, Simmons, 2002), finance (Chengfeng, 2003; Simmons, 2002; Lee, 2000), social interactions (Gagnon, Legare, Labrecque, Fremont, Cauchon & Desmartis, 2007; Chengfeng, 2003), lack of computer knowledge or skills (Chengfeng, 2003; Gagnon et al., 2007; Lee, 2000), and lack of E-learning skills (Chengfeng, 2003; Simmons, 2002; Berge, 1998) have emerged as the most common ones. Having identified the major barriers by various researchers, the barriers specific to teachers are presented in greater detail in the next section.

2.4.7 Teacher Barriers to Online learning

As discussed above, Lee (2000) classified teacher barriers to online learning in a computer-assisted language learning environment as:

a) Financial barriers;

b) Availability of computer hardware and software;

c) Technical and theoretical knowledge; and

d) Acceptance of the technology.

Perreault, Waldman, Alexander and Zhao (2002) conducted a study of 81 business professors who taught distance-learning courses at 61 U.S. business schools accredited by the American Assembly of Collegiate Schools of Business. They found that professors:

a) Primarily used self-training for the design and delivery of online courses;
b) Believed that the technology was not sufficiently reliable;
c) Believed that the greatest benefit of distance-learning was flexibility for students;
d) Perceived a student-centered teaching approach as necessary for successful distance-education courses.

Beamish, Armistead, Watkinson and Armfield (2002) reported cultural resistance by managers and employees, employee computer literacy, security issues, and hardware, software and network limitations as barriers in a study of remote electronic learning (E-learning) in nine large organizations. Gunasekaran, McNeil, and Shaul (2002) studied why the market place was not responding to the growth of E-learning in higher education sufficiently and stated that issues such as the confidence with which college faculty integrate technology in their teaching, plagiarism, and communication remain as barriers. Finally, Berge (1998) conducted a survey of 42 online instructors to find out the barriers they perceived to prevent the success of their online courses. These barriers were discussed with reference to a policy development framework for distance-learning suggested by Gellman-Danley and Fetzner (1998). The 42 teachers responding to this survey taught adults at undergraduate and graduate levels or in continuing and professional development, or some combination of these areas. Their experiences ranged between 2 to 38 years.

These teachers were asked the question "What barriers are the most daunting to your online teaching?" and 28 of the 69 responses were fitted with the key issues given by Gellman-Danley and Fetzner (1998). The remaining 42 barriers were classified as 'technical' or 'cultural'. Table 2.2 shows the number of barriers in each of the nine fields thought by respondents to be hindering policy development.

Out of 69 barriers, 19 of the barriers (27.5%) mentioned by the respondents to this survey indicated inadequacies in the technical area such as a lack of system reliability, lack of connectivity/access; inadequate hardware/software; setup problems; inadequate infrastructure; and inadequate technical support. According to Pappas (1996) it is the beliefs, values, expectations, language, motivation, and norms in place in the organization which can be the main barriers to innovation in teaching. This was the largest category of barriers with twenty-two of the responses (31.9% of the total) indicating reluctance or inability to deal with the cultural changes often engendered by online teaching. Responses placed in this category included: faculty or student resistance to innovation; resistance to online teaching methods; difficulty recruiting faculty or students; lack of understanding of distance education and what works at a distance.

Table 2.2 - Policy Development Areas for Distance Learning, (Berge, 1998)

Policy Development Area Key Issues [Barriers]	Number of Barriers
1. Academic calendar, course integrity, transferability, transcripts, evaluation process, admission standards, curriculum approval process, accreditation.	**7**
2. Fiscal Tuition rate, technology fee, FTE's, consortia contracts, state fiscal regulations	5
3. Geographic Service Area Regional limitations, local versus out-of-state tuition, consortia agreements.	1
4. Governance Single versus multiple board oversight, staffing, existing structure versus shadow colleges or enclaves.	0
5. Labour-Management Compensation and workload, development incentives, intellectual property, faculty training, congruence with existing union contracts.	8
6. Legal Fair use, copyright, faculty, student and institutional liability.	0
7. Student Support Advisement, counselling, library access, materials Services delivery, student training, test proctoring.	7
8. Technical Lack of systems reliability, lack of connectivity/access; inadequate hardware/software; setup problems; inadequate infrastructure; inadequate technical support.	19
9. Cultural Faculty or student resistance to innovation; resistance to online teaching methods; difficulty recruiting faculty or students; lack understanding of distance education and what works at a distance	22

The limitations of the study were that this survey dealt with only a small segment of subject areas and only from a teacher perspective. The researcher says,

'This small, convenience sample means that, while there were commonalties among these 42 teachers, the findings are not generalizable to other courses, teachers, or even within the formal, post-secondary setting. The self-reported data was not challenged or probed. No attempt was made to verify that what these teachers said was actually what they did (e.g., through observations, or interviews with learners in their courses). Additionally, the biases in online teaching, educational philosophy, and subjectivity while coding and categorizing responses may have influenced the analysis of the data. Further, the teachers in this survey were self-selected and there may be significant differences between them and non-respondents who also teach online'. *(Berge, 1998, p.4.)*

The researcher points out that the most critical obstacles reported in this survey appeared to be the following:

a) Related to persons' resistance to, or fear of, the many changes that must occur at the individual and organizational level and the lack of support for the changing roles of students and teachers;
b) Difficulties in assessment is another important barrier and involves evaluating students' online work, as well as the rewarding, compensating, valuing, and supporting of faculty members' teaching online.

The researcher concluded by suggesting that, based on this survey, additional area of policy interest besides the seven in the Gellman-Danley and Fetzner (1998) framework should involve technical or infrastructure needs in the educational system. He also noted that at least half the barriers mentioned by these online teachers have to do with culture.

From the above discussion I conclude that teachers face significant barriers for success in an online environment. These may in turn be related to student barriers. For example, as teacher's confidence and experience with online teaching improves, the student barriers related to the instructor may be reduced. Similarly, as students learn to use an online environment for discussing ideas and social interactions, teachers may be able to understand student difficulties, and address their issues of social isolation in an online environment. The next section deals with student barriers to online learning which is of immediate concern to this study.

2.4.8 Undergraduate Student Barriers to online learning

A range of barriers to undergraduate students using online learning have been identified by previous researchers which are discussed in this section along with some of the advantages.

(1) Student feedback on a blended learning course:

Concannon, Flynn and Campbell (2005) conducted a study by collecting student feedback on factors related to the use of ICT in an accountancy course designed in a blended format. This study gives us the positives as well as the barriers as students learnt to use ICT as a support system for a campus-based undergraduate course. The sample of the study involved approximately 600 first-year undergraduate students at the University of Limerick who were taking The Principles of Accounting module in a blended learning format as part of a wider course, leading to a degree in Business Studies or Law and Accounting. The majority of students were between 17 and 19 years of age, coming from distributed second-level schools in Ireland and a few of them were Erasmus students from various European countries, or mature students over the age of 23.

To most students, this was their first experience in using an E-learning course although most had previous experience using the web to gather information, or preparing coursework in second-level education, prior to entering university. The E-learning course studied here was delivered by using a blended learning approach, supplementing weekly lectures, tutorials, and laboratory sessions with online course content, interactive quizzes, and Excel tasks. Students also had a range of different E-learning assessments along with traditional weekly meetings and had to submit a compulsory paper-based accounting case study, and additionally were offered two optional ICT assignments, a stream of online multiple-choice quizzes, and an Excel project. The researchers used both qualitative and quantitative techniques to gain an appreciation of the students' experience with ICT and blended learning for the module. They used three main methods, namely, tracking data of time spent online

for each student through web server log files; a survey of open and closed questions; and focus groups.

The main findings were based on the survey and focus groups containing students' perceptions of the E-learning process and product and were supported by the quantitative measures (i.e. user time online and closed survey questions) where appropriate. The data were analysed to find out the major factors that influenced the learning experience, with particular reference to the E-learning tasks, the three online tests, and the Excel case study. The findings were grouped into four factors. Regarding computer access, the researchers found that in spite of 14% of the students having very little or no prior experience with computers, none of the respondents expressed difficulty in accessing the web site, or sitting the online tests, suggesting that, because of the inherent usability of these systems, generic computer training is not required, even for students with no prior knowledge of computers. They also found that it was the learner attitude to computers and awareness of online resources that seemed to be a stronger predictor of a student's likelihood to use these ICT resources rather than prior knowledge of computers. Similarly, students varied in their awareness of online resources.

When the researchers examined the study patterns of the students, they found that students had either a 'cramming' style of revision or learnt at a more continuous pace. The latter were more motivated to access web-site resources. Another finding was that pacing of three online tests at intervals throughout the course helped students to revise on a more continuous basis. The researchers argued that the underlying pedagogic design was the one which facilitated this change, rather than the technology per se. Regarding students' preferred educational resources, they found that all of the students used similar strategies and resources in studying for the

module; that is they would typically revise lecture notes and tutorial notes, relying on the web site as a centralized resource for extra readings and missed information. 81% of survey responses revealed that traditional lectures and tutorial groups result in more effective student learning than a pure E-learning environment (Concannon et al., 2005). An interesting comment in one of the focus groups was the following: 'Most students do spend time on computers in college. It is easier and not as drawn out, than having to look up books. I expect [E-learning materials] for all my courses (Focus Group 1, week 8, p. 508)'.

With regard to future career plans, the researchers found that students with long term career plans were more likely to report positive feelings towards using technology relating computer skills as essential for their later professional life. 'I just want the experience in Excel. I think it's important for a job afterwards. I don't know if I will finish it yet, but I'm going to try (Focus Group 2, week 8. p. 508)'. Those who had no career goals saw no connection between the two. Regarding the support factors, the researchers found that a) support through peer encouragement, and b) perceived tutor and lecturer support were crucial in predicting the students' motivation to use the ICT support for the evening laboratory tutorial sessions and attempt optional Excel based case study task for obtaining 10% of the modules total marks. The students also 'reported converging in the same computer lab, at the same time, on their own initiative, to undertake the online tests, illustrating a novel and unintended use of the technology' p. 508. The focus groups also helped a great deal in changing students' attitudes towards using ICT.

The researchers found that students used the online discussions with tutors and e-mail for task deadlines, requirements, and difficult questions that they could not find an answer to by asking their classmates. However, asking tutors during the

lab sessions, or emailing the lecturer was a preferred method of getting answers to more difficult and critical questions. Regarding lecturer-controlled factors (organizational factors) the findings from the focus group sessions included the importance of a reward structure that encouraged students to rely on the online resources, without negatively punishing them if they chose not to use them. Regarding scheduling of lab courses in the evening, the findings were that students' attendance to the evening lab course was less as it encroached upon all their sports and socializing activities. For the last lecturer-controlled factor, the findings were that the navigation of the materials was the most important:

> *'Being able to find resources quickly and easily, along with recognising new additions to the site, at a glance was stressed as key. Interactive quizzes should be able to provide instant feedback, along with comments on questions that were not answered correctly.'*
>
> *(Concannon et al., P. 510.)*

The findings for the University course factors that influenced the students' experience with the learning technology were that, in addition to regular access to a computer, the students found the availability of technical support as an important factor. The researchers found some generic patterns of a student studying in higher education such as their preferred educational resources, their attitudes to computers, their study patterns, and future career plans. Also lecturer and university factors such as the reward structures, the lab times, the instructional design of the content, access to computers, and technical support were of importance. The most important factors that evolved out of this survey were peer encouragement and perceived lecturer and tutor support. These are similar to the social barriers that emerge as a factor in several studies. However, this study found that given sufficient rewards for using ICT support for their course work, students were using the Internet as a secondary resource, along with textbooks, to supplement the lecture and tutorial notes.

Learning strategies also changed towards continuous revision for online tests. The online medium also encouraged individualized instruction with the help of 'Flash Demos' which was not possible in large labs with a number of students. The researchers summarized that students saw E-learning as an expected and integral part of the learning process within higher education.

Major benefits included the ease of access to resources, given the limited books in the library, and the provision of a central area for students to access information or comprehensive resources pertaining to each module. Over 70% of the students in the end-of-semester survey commented that they were happy overall with the E-learning aspect of the module.' (p. 510). All the negative aspects regarding the course were technology-related. To summarise, as in judging the success of any course, the age and characteristics of the learner were factors which were found to have a bearing on the outcomes. In the above study, focusing on students in the age group of 17-23, the blended learning format seems to work well with students successfully using ICT for their courses in spite of sufficient computer knowledge sometimes. Using rewards, peer/tutor support and technical support seem to help students overcome time barriers, social and technical barriers respectively.

(ii) Student Withdrawal from Online Courses:

Jones, Packham, Miller, Davies and Jones (2003) conducted a study to examine student withdrawals associated with online BA Enterprise programme initiative designed by the University of Glamorgan. This paper examined the retention issues within the programme and identified whether the causes of withdrawal correlated with the existing academic literature. To investigate the research proposition the researchers used both quantitative and qualitative research methodologies. They also used descriptive statistics to provide a demographic profile

of learners. Using content analysis of student feedback the researchers identified reasons for withdrawal. The sample consisted of 44 students of the Coleg Sir Gar, Carmathenshire College. The researchers first collected data regarding the student cohort and completion, withdrawal and deferral information. Having done this, the researchers collected information from twenty (87%) withdrawn students from the programme using a semi-structured questionnaire.

The study found that successful students who completed the course were typically non-HE qualified, self employed and aged between 31 and 50. Gender was also a related factor with female students completing courses more often and older males particularly more likely to withdraw. The extensive demands in terms of commitment and time did not provide motivation for students who already had existing undergraduate and post-graduate awards to pursue the course. The researchers found 8 prime causes of withdrawal and categorized them as extrinsic (external to the University) or intrinsic (course related barriers, which the University could influence). The intrinsic barriers were found to be technical issues, assessment (quantity and nature of) and readiness for the course. Extrinsic factors were barriers to E-Learning which included the students' academic profile, their family situation, employment and nature of their jobs, and available study time.

(iii) Students' perceptions of online learning versus classroom learning:

Muilenburg and Berge (2005) undertook an analysis of student barriers by conducting a survey of responses from students (n=1056) to a questionnaire. The study began with interest in finding out how students perceived online learning in comparison with classroom learning and to find out what individual differences among students lead to differences in student perceptions of barriers. The survey investigated the effects of eleven independent variables, namely age, gender, self-

reported ethnicity, type of learning institution they attended (Community college, graduate, undergraduate, business/corporate/non-profit, and government/military), ability and confidence with online learning technology, learning effectiveness in online technology, learning enjoyment in the online classroom, the number of online courses completed, the number of online courses dropped, the likelihood of taking a future online course, whether or not students experienced prejudicial treatment in the traditional classroom due to disability, cultural background, or other personal characteristic. The data for Muilenburg and Berge's study were collected through surveys initiated by individual email messages sent to announce the pilot study to personal acquaintances and thousands of individuals from mailing lists.

Volunteers were asked to complete the online survey regarding barriers to distance education. After an initial pilot, data were collected using the second survey from July 2003 to November 2003. A total of 1056 valid survey responses were analysed using SPSS and respondents were classified into groups based on the 11 variables listed above. Using a principal component factor analysis (PCFA) with varimax rotation, eight factors were identified which accounted for 62.4% of the overall variance. A cut off for significance for factor loadings of 0.5 was used. Finally, the significant factors that emerged out of the analysis were: administrative issues, social interactions, academic skills, technical skills, learner motivation, time and support for studies, cost and access to the Internet and technical problems. To determine whether particular subgroups of respondents viewed barriers differently, a series of ANOVAs was conducted using factor scores for the barriers as dependent variables. Ten of the eleven independent variables tested affected student barriers. The researchers calculated factor scores for each of the eight factors identified above and used the means (M) for the eight factors to rank order the barrier factors

from the most severe to least severe. The means of the eight factors M ranged from 1.22 to 2.36. The single most important barrier to students learning online was a lack of social interaction (M=2.36) followed by administrative/instructor issues, (M=2.05), time and support for studies (M=1.91), and learner motivation (M=1.91) which clustered very closely as the next most severe barriers. Less important barriers were technical problems (M = 1.70) and cost/access to the Internet (1.60). Lack of technical skills and academic skills appeared as very low obstacles to learning online (M = 1.30 and 1.22).

The researchers conducted a series of ANOVAs to determine whether particular subgroups of respondents viewed barriers differently, using factor scores for the barriers as dependent variables. Ten of the eleven independent variables tested were found to affect student ratings of barriers to online learning significantly ($p < 0.05$). They were gender, age, and ethnicity, type of learning institution, self-rating of online learning skills, effectiveness of learning online, online learning enjoyment, the number of online courses completed, and the likelihood of taking a future online course, and persons who reported experiencing prejudicial treatment.

The variable number of courses dropped did not show significant differences among the means. To determine the strength of association of the independent variables to each of the eight barrier factors, eta squared was calculated for each ANOVA.

The researchers limited their interpretations to four most critical barriers previously identified:

a) Social interaction;

b) Administrative/instructor issues;

c) Learner motivation;

d) Time/support for studies.

They also focused on the five independent variables that had the greatest effect on the above four barriers (measured by large effect sizes), namely:

i. Ability and confidence with online learning technology;
ii. Effectiveness of online learning;
iii. Online learning enjoyment;
iv. Online courses completed; and
v. The likelihood of taking a future online course.

1) With regard to ability and confidence with online learning technology, the researchers found that respondents with the highest level of comfort and confidence using online learning technologies perceived significantly fewer barriers for social interaction, administrative/instructor issues, learner motivation, and time and support for studies than the other three groups who were unsure of their skills or were not using online learning technologies. Differences among the less confident groups and those not using online learning technologies were not significant. With regards to the association between ability and confidence with online learning technologies and the dependent variables - social interaction [η^2 (eta squared) = 0.116], administrative/instructor issues (η^2 = 0.064), and learner motivation (η^2 = 0.124), and time and support for online learning (η^2 = 0.053), eta squared varied between 0 and 1. As a guideline the authors say that values "of .01, .06 and .14 are by convention interpreted as small, medium and large effect sizes, respectively" (p.38)
2) With regard to effectiveness of online learning, the researchers found a significant relationship between ability and confidence with online learning technologies and dependent variables namely social interaction,

administrative/instructor issues, learner motivation, time and support. Students who indicated inability to learn well online (or predicted a lack of success) had the highest barrier ratings, followed by moderate level of barriers for those who indicated their learning online was equal to the traditional classroom and lowest barriers for students who felt they learned better online. The researchers noted that, interestingly, students who had not taken online classes predicted higher barriers than students who had taken classes. The researchers found a strong association between effectiveness of online learning and social interaction (η^2 = 0.378), administrative/instructor issues (η^2 = 0.169), and learner motivation (η^2 = 0.213). "Effectiveness of online learning had a moderate effect with time and support for online learning (η^2 = 0.079)" (p. 41).

3) Online learning enjoyment showed the same trend as that seen for effectiveness of online learning. Online learning enjoyment was inversely proportional to the barriers they faced. The predicted levels were once again higher at each level of enjoyment compared to actual experiences with online learning. The strongest association found in this study was between online learning enjoyment and social interaction ($\eta 2$= 0.397), administrative/instructor issues ($\eta 2$=0.153), and learner motivation ($\eta 2$= 0.161). Online learning enjoyment had a small effect with time and support for online learning ($\eta 2$= 0.046).
4) With respect to the number of online courses completed, the researchers found that respondents who had never taken an online course (n = 347) rated each of the factors as significantly more severe barriers than any of the other groups. The study also found that as people complete more online courses, ratings of the barriers decrease, with huge perceptible drop in barriers just after completing one course. The number of online courses completed had a moderate effect on

barriers perceived in social interaction ($\eta^2 = 0.133$), administrative/instructor issues ($\eta^2 = 0.068$), and learner motivation ($\eta^2 = 0.112$). There was a small association between the number of online courses completed and time and support for online learning ($\eta^2 = 0.030$).

5) Lastly, with respect to the likelihood of taking an online course in future, the researchers noted that for the social interaction, administrative/instructor issues, and learner motivation factors, there was a statistically significant pattern: as the barriers perceived decreased, the likelihood of taking a future online course increased. The highest mean barrier rating ($M = 3.66$) found in the study was for the social interaction barrier when considering the likelihood of voluntarily taking a future online course. The researchers concluded that overcoming the lack of social interaction in online courses was a major contributor to the decision to continue with online learning. The likelihood of voluntarily taking a future online course was related strongly to social interaction barriers ($\eta 2= 0.261$) and problems with learner motivation ($\eta 2= 0.146$). Administrative and instructor issues ($\eta 2= 0.088$) had a moderate effect size. There was a small association between the lack of time and support for online learning and the likelihood of taking a future online course ($\eta 2= 0.028$).

The researchers pointed out that the limitation of this study was that the research design does not imply causation. They gave an example to illustrate this. "For instance, a lack of social interaction was the most severe barrier as perceived by students overall. The findings here are that social interaction is strongly related to online learning enjoyment, effectiveness of learning online, and the likelihood of taking another online class. Therefore, it seems logical that improving social interaction in online learning would lead to a more effective and enjoyable

educational experience; one that students would want to repeat. However, this research design does not speak to causation. It may be that increasing social interaction would lead to educational benefits. Conversely, it may be that because students enjoy online learning, or believe that online learning is as effective as in-person education, their social interaction is improved.

Perhaps certain types of students simply don't need much social interaction to find learning enjoyable and effective. Several barrier factors and independent variables in this study are open to this type of speculation regarding the direction of causation. "For those distance educators and researchers interested in reducing student barriers to distance education and improving online learning, further investigation of causation may be a useful line of research" (Muilenburg & Berge, 2005, p. 45). Another limitation of this study was how they collected their sample, through e-mailing acquaintances and individuals. Those responding are already partly committed and skilled to the extent that they filled in the questionnaire, therefore the sample is biased.

(iv) Gender differences regarding barriers to participation:

Blum (1999) studied the gender differences in students attending a CMC-based (Computer-mediated communication) distance education programme in an online environment by using a case study methodology. The purpose of the study was to determine if there were any significant differences between male and female higher education students in CMC-based distance education by examining barriers to participation, learning styles, and communication patterns of online student messages. The researcher wished to use the results of this research as a theoretical model to create equitable CMC-based distance education learning environments for both male and female adult students. Blum collected data from 149 online messages

of students attending a large, U.S.-based higher education organization providing distance education that used asynchronous, CMC-based technology for instruction.

Students were non-traditional undergraduate and graduate students over the age of 25 in employment and mostly belonged to the ranks of middle and lower management, supervisors, technicians, specialists, and to a lesser extent to front-line production and service workers. The online messages passed between these students were analyzed for gender differences by performing a content analysis using Nud*Ist software. The first variable studied was learning style. Based on a literature survey, separate, and connected learning style models were used as a framework to compare learning styles of male and female students. According to earlier studies, adult students were found to typically prefer learning in either a separate or connected manner.

Students who preferred to learn in a separate manner were found to be associated with autonomy, separation, certainty, control, and abstraction and the gender of separate learners was often male. In contrast, connected learning style was one which placed emphasis on relationships, was empathetic in nature, and one where cooperation is stressed rather than competition and this style was mostly seen in females. The second variable of interest in this study, participation barriers was analyzed following Cross's model (Blum, 1999) of classifying barriers into institutional, situational, and dispositional categories. Institutional barriers not influenced by gender consisted of all those practices and procedures that exclude or discourage students from participating. Situational barriers were those arising from one's situation in life at a given time. Dispositional barriers were those related to attitudes and self-perceptions about the student as a learner.

The third variable that was examined in this study was differences in communication patterns such as tone, content, and length of each message. It was analyzed to gain insight into the position of the sender as one seeking power, striving to help others, or as one seeking to establish status. Also it was noted that online female students exhibited characteristics of face-to-face learning styles because they exhibited signs of preferring to learn in a connected manner following Belenky, (1997) and MacKeracher models (MacKeracher, 2004). These models suggested that female students placed emphasis on relationships, are empathetic in nature, and preferred to learn in an environment where cooperation is stressed rather than competition.

With respect to barriers to participation in courses Blum (1999) conducted a content analysis from one month of online student messages and found that there were gender differences between male and female distance education students which contributed towards inequitable gender differences which were both similar and different from the traditional learning environment. The findings for online institutional barriers suggested that these were higher for females than males. She found that a higher proportion of females lacked technical skills and confidence working in an online environment. The findings suggested that female students were also concerned about the pace of learning in the online classroom. Blum also found that females had higher situational barriers in higher education related to lack of time, more so in distance education than traditional students in face-to-face environments. In addition to being primary home-carers, many of the female students were also full-time working professionals who found it difficult to reserve time for education. Regarding dispositional barriers, Blum found that females were

dominated by males in an online environment similar to face-to-face environments and had lower confidence in self and in learning and negative attitudes to computers.

Blum made the following suggestions to meet the needs of learner styles and overcome participation barriers of female students in online distance education courses. With regard to institutional barriers, her findings suggest that females also have higher technological barriers. Blum suggested that practices, which could be implemented to lower this barrier, are: procedures for the technical aspects of learning at a distance, a strong technical support department, and procedures that weigh carefully the use of short-term courses using CMC-based technology.

In order to reduce situational barrier for females the author suggested that institutions could make it a policy to include more collaborative and cooperative learning in their courses by distributing the workload through a group and sharing results to further learning. However, this should reduce the time required for female students while supporting their preferred method of connected learning. Blum also suggested that by using programmes which teach female students how to synthesize and analyze information, skills that are typically associated with the often 'male separate' learners, would be beneficial towards lowering female barriers, especially in distance education as learners are faced with massive amounts of information. Technical barriers could be addressed in a similar manner where female students are required to attend a student orientation that introduces procedures for learning at a distance such as directing one's own learning and having study strategies. Data from this study suggests that this is particularly important for female distance-learning students.

The above study was published in 1999, and the figures and situation probably depicted the picture of 1997 since when there have been many changes in

online learning provision. However, as far as CPD learners are concerned, in a more recent study conducted by Gagnon et al., (2007), lack of time, lack of computer skills and social barriers still formed the major barriers for completing online courses. In a large survey consisting of a mixed group of on line learners (from various age groups and subject areas) conducted by Muilenburg and Berge (2005) (a) social interaction, (b) administrative/instructor issues, (c) learner motivation, and (d) time/support for studies emerged as the most significant barriers. The variables that were found to affect these most were (a) ability and confidence with online learning technology, (b) effectiveness of online learning, (c) online learning enjoyment, (d) online courses completed, and (e) the likelihood of taking a future online course.

2.4.9 The Attitudes of Professional dentists toward CPD

Brown et al (2002) explored the issues surrounding the assessment of attitudes in undergraduate dental programmes. The paper addressed five questions:

- What are attitudes?
- Why focus on them?
- Can they be changed?
- Can they be taught?
- How can they be assessed?

They used the term 'attitude' to describe a mental posture or stance towards objects, people, processes or institutions. The authors' preference was to describe an attitude as a "mixture of beliefs, thoughts and feelings that predispose a person to respond, in a positive or negative way, to objects, people, processes or institutions" (p. 703). The undergraduate curriculum needs from the General Dental Council and

the attitudinal objectives have been summarised in the paper and also its importance underlined and therefore its assessment at undergraduate level is seen as worthwhile.

Mercer, Bailey and Cook (2007) reported on a survey of attitudes of general dental practitioners and dental nurses to continuing education. The study randomly chose a sample of one in every three practices from 7 regions for which the Yorkshire Deanery provided courses. In all, 141 practices were selected. This was undertaken as a postal questionnaire with a covering letter. The return ratio for general dental practitioners was between 75-80%. The majority of the dentists in the survey had access to computer facilities (80%) and about 67% of them access to computer aided learning programmes.

2.4.10 Assessing the Professional Development Needs of Professional dentist-Learners

Continuing professional development is mandatory for professional dentists as a requirement to maintain registration with the general dental council in the UK. This was not the case for dentists in India at the time of conducting this research. Eaton et al. (2011) concluded that although the literature identifies a range of regulatory benefits of participation in continuing professional development it however does not clearly demonstrate relationships between this and the quality of care delivered, performance, professional standards, competence, public satisfaction or safety (p. 26). In addition, the authors concluded that in dentistry there were no clear indications in the literature demonstrating the regulatory purpose of mandatory continuing professional development although in other health care sectors this focussed on maintaining and demonstrating professional standards and competency to the public (p. 27).

2.4.11 The Needs of Particular Types of Faculty Members

Carrell and West (2008) investigated how professor quality affected student achievement for 30+ core courses at the US Air Force Academy. Their findings demonstrated that in introductory courses, the teaching quality of the professors significantly affected student achievement in follow up courses. They also found that student evaluations of professors positively predicted student achievement in contemporaneous courses but poorly predicted follow up student achievements. With the advent and development of online based assessments and education delivery these factors will need to be re-evaluated.

In order to deliver effective continuing professional development, teachers will also need to undertake continuous training and development. Caena (2011), who conducted a literature review of the professional development of teachers, found that "The significant, positive correlations between teacher quality and student achievement, as most important within-school factors explaining performance, and between in-service training and student outcomes, are consistently borne out by research" (p. 2). Although this review is in a school context this would also be relevant in postgraduate teaching.

Rogan (2014) mentions in her study that the literature supports the fact that student learning outcomes are poorer when students have completed courses taught by non-tenure track faculty compared with those taught by tenure track faculty.

2.4.12 Challenges and barriers to CPD for Healthcare Professionals

Gagnon, Legare, Labrecque, Fremont, Cauchon and Desmartis (2007) conducted research to identify physicians' beliefs regarding their completion of an online programme on Evidence Based Medicine (EBM) by Continuing Professional Development. The researchers used a semi-structured telephone interview guide

based on the theory of planned behaviour (TpB), to assess respondents' attitudes, perceived subjective norms, perceived obstacles and facilitating conditions with respect to completing the Internet based CPD programme. For the CPD programme, 40 physicians had enrolled and had paid to register but only three of them completed it (less than 10%). 35 physicians (88%) were interviewed and the findings were discussed. The EBM programme was for providing critical appraisal of the medical literature and information mastery skills through an online continuing medical education (CME) course of the Faculty of Medicine at Laval University, Quebec, Canada.

The instruction method consisted of problem-centred and self-directed learning from clinical cases, critical reading of scientific articles, interactive exercises and post-tests with feedback. The results of the study showed that the perceived advantages of completing the programme were in complete agreement with the general benefits of the CME, such as updating knowledge and developing skills that can induce effective change in professional practice. Lack of time was by far the most frequently reported barrier to completing the programme which may be related to contextual factors such as the length of modules and personal factors such as their perception of personal investment needed. As in other studies reviewed earlier in this chapter, a lack of computer knowledge and skills were also identified as major obstacles to Internet adoption in medical practice. The results regarding the influence of social factors were mixed with some respondents mentioning the possibility of team-work as a facilitating factor in completing the programme. The findings suggest that emphasizing benefits related to the quality of patient care could be useful in promoting the value of E-learning on EBM among physicians.

The researchers concluded that the completion of the programme could be encouraged by improving physicians' perception of ease of use and self-efficacy. Technological barriers such as problems with Internet connection should be taken into account since they could be easily modified. The strength of this study was that it added to the knowledge of learner experiences in E-learning in CPD courses.

Using TPB for assessing beliefs regarding perceived advantages as well as barriers and facilitators to online CME helped provide a theoretical base for understanding the decision-making leading to the behaviour. The limitations of the study were its small sample size, data collection methods and limited sources such as interviews and field notes. The researchers cautioned that it was not clear whether the results related to the completion of an E-learning programme or a programme on critical appraisal skills and information mastery or both. The researchers used the results of this study to develop a second version of the EBM programme which included shorter and more interactive modules, instructions to download content to a personal assistant, the capacity for participants to follow their progression through the modules, and communication tools (e-mail and forum) allowing interactions between learners and learners and facilitators. From this study we can conclude that lack of time, inadequate computer skills, and social barriers to a certain extent form barriers to the completion of CPD courses online.

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2.4.13 Relevance and Motivation for CPD

In the above review of previous research in this chapter two important factors: Relevance and Motivation; have been reported by several research teams as having an impact on the take up of Professional Development Courses. In a study by Sperber and Wilson, (1995) they found that learning and CPD is perceived to be relevant when the students understand how this information or skill has some application in their lives, and that they have an opportunity to follow their own process rather than just learn “the facts,” [and] is not just learning content and skills, but is learning how they learn.

According to Sperber and Wilson (ibid.), the harder one has to work to determine the relevance of information, the less relevant that information becomes and the less that information is valued. Relevance also depends on whether the learner (or user) identifies the information as being valuable at a given time, for the relevance of information may change depending on the learner's present personal or professional situation (Schamber, Eisenberg & Nilan, 1990). This means that online CPD for professional dentists will depend on their personal situations as well as their professional requirements. Rogan (2014) mentions in her study that relevance can rely on several factors. In addition when old and new information come together the resultant generated information may or may not be relevant (Sperber &Wilson, 1995).

Motivation to learn has been studied widely as reported earlier in Section 1.4.3. The visible outcome of motivation is engagement in learning (Wlodkowski, 2003), and motivation is influenced by one's emotions, language, beliefs, values, and behaviours (Wlodkowski, 2003). One's interest in a given topic is the key to developing a positive attitude toward learning; Wlodkowski refers to it as an emotional nutrient. Measuring a learner's motivation to learn is challenging but there are some reliable, rigorous instruments to do so, particularly the seminal work on learner motivation. Although a legislative requirement to remain registered with the General Dental Council in the UK may act as a motivational factor for dentists to pursue continuing professional development, the purpose and benefits of such a requirement may be open to debate (Eaton, 2011)

2.5 Conclusions

In conclusion, from the review of previous research in this chapter into student learners (as apposed to CPD learners), we may conclude that online student

learners are able to overcome barriers connected to lack of computer knowledge, social interaction, or technical knowledge in a blended learning format. This may be partly due to the fact that ICT was often only used as a support to the campus-based course where students had access to face-to-face interactions and used lecture notes and tutor groups. It may also be due to the age of the learner (17-23) where time commitments to work and family are not yet as prevalent as in learners taking CPD courses.

Lack of time, social barriers, lack of computer skills, and learner motivation were shown to be the most significant barriers for learners following a CPD course. Some of these have been shown to be related to gender, their ability and confidence with online learning technology, effectiveness of online learning, online learning enjoyment, and number of courses completed online. However barriers related to online social interaction, time and technical skills for female learners needs further research. Previous research also suggests that the perceived barriers by learners who have never taken an online course are greater than the actual barriers faced by learners (Muilenburg & Berge, 2005) and these may reduce drastically after a single online course has been taken. The research reviewed in this chapter considered a range of students taking under-graduate, master's level courses and studying a variety of subject areas.

When this PhD study began there were two specific issues which needed further research. The principal aim was to determine the factors which encouraged or discouraged professionals, specifically dentists, to take up online CPD courses. The main reason for this was that although there were a plethora of distance education courses available in the world including India, yet there was no clarity regarding the factors which determined uptake by the dental professionals as has been shown by

the review in this chapter. The second aim was to investigate what barriers existed which prevented them from continuing with their professional development through on-line distance education courses.

The first aim regarding the factors that either encouraged or discouraged professionals from the uptake of distance-learning and face-to-face courses was identified from the following:

Factors which emerged from the literature review include:

1) Distance education had unlocked the opportunities to new target populations previously deprived of CPD, and has informed the design of appropriate courses, learning methods, and delivery systems.
2) There was greater flexibility in the curriculum and content of online learning materials than for traditional courses and programmes.
3) Most importantly regarding logistics and costs: online and blended courses brought flexibility, lowered unit cost per student than conventional education, and enabled systematic usage of infrastructure.
4) Barriers to providing online courses for the teachers were: insufficient time to develop such courses, not fitting within the traditional curriculum, lack of agreed policy and fear of the technology.
5) Factors influencing the take up of continuing professional development included: professionals' attitudes towards their professional needs, perceived importance of the best methods for updating their knowledge and skills; and confidence in using the technology required.

The facts that were unknown were:

- What factors motivated or demotivated professional dentists to take up distance education courses?

- What was the relative importance of all the factors, previously identified through other studies discussed in this chapter, to distance-learning for professional dentists in a developing country?

1) Continuing professional education for practicing dentists through distance education had become available for several years because of the greater flexibility it offered, and it appeared to be more cost effective. Before it became popular, designing of content material, courses, learning methods and delivery system needed to be addressed. Therefore before establishing a curriculum it was indeed necessary to know the possible factors that motivated or demotivated professionals from taking up of such courses. This PhD study had as its principal focus the aim of determining and analyzing those factors.
2) The second aim was regarding the yet unknown barriers to such courses. The review of previous research into teachers' barriers to distance-learning and students' barriers to distance-learning more generally, discussed above had implications for this PhD study into the uptake of a highly technical and skilled programme for professional dentists. The main barriers identified by previous studies can be considered being in two categories:
   a) Barriers to students taking up distance education courses;
   b) Barriers to students continuing with a distance education courses

The literature review of various models discussed in the next chapter identified the range of variables which might influence the consequent students' learning and the factors which influence the delivery of courses in education.

The reasons for choosing India as the context for the study were the following:

Firstly, being the seventh largest nation in the world it has wide geographical and social variations which might be an important influence on the uptake of online courses by professional dentists. Secondly, India has been and is at the hub of a revolution in information technology with good information technology infrastructure. This had resulted in the development of a range of courses offered across the country from various universities, although little was known about the possible barriers. Simultaneously, there have been many courses offered by various universities to professional dentists. Thirdly, there has been little conclusive research evidence depicting the advantages, disadvantages, or barriers regarding such courses specifically for professional dentists, although, as discussed above, there have been several studies by various scholars on students' reasons for drop-out (Mishra & Garg, 2009; Nigam & Joshi, 2007); on identifying further research areas in DE (Fozdar, Kumar & Kannan, 2006) and an overview of E-learning in India (Mishra, 2009, Passi & Mishra, 2004). Therefore it was decided that India provided an ideal setting to investigate this area for this PhD study. The following chapter presents a review of a range of theoretical models which helped to confirm which variables identified from this literature review of the empirical evidence would need investigating regarding the aims of the study.

CHAPTER 3: THEORETICAL MODELS FOR EDUCATIONAL INNOVATIONS

3.0 Introduction

As has been discussed in Chapter 2, there is a substantial body of empirical evidence regarding different aspects of online and blended learning courses in higher education. This chapter presents a survey of different educational models used by previous academics for the design of distance-learning courses and pertinent theoretical models of higher education with distance-learning in particular to help identify a model which would inform the design of the study. The chosen models belonging to Entwistle and Ajzen served as theoretical frameworks for designing the study. The substantial number of empirical studies in the field of distance education has led to its identity as a specialized area within the broader field of education. Consolidating the studies on individual components of distance education would help me investigate the system as a whole. Theoretical models which have been developed based on the analysis of substantial empirical data have helped researchers to see relationships between various components in a system while others have been developed to form frameworks for the design of distance education courses.

Several models have been developed in the field of distance-learning (Longworth & Gwyn, 1989; Bullock & Ory, 2000). Their development and analyses of models has helped in analyzing problems within a system, suggesting methods to study the components within it and designing new courses and modifying existing courses (Mishra and Koehler, 2006). Models can therefore help us to understand the complex nature of distance education (Webster & Hackley, 1997, Cleveland & Bailey, 1994, Storck & Sproull, 1995) especially in the wake of its crossing

international boundaries. In this chapter, the models proposed in distance education are outlined and discussed. Some of the studies integrating several models have been reviewed in Chapter 2.

3.1 Models for the Design of Distance Education Courses

According to Peters (2001), 'the pedagogy of distance education cannot be reduced to the totality of those technological tricks that merely enable learning and teaching at a distance'. Ma, Huang and Tosiyasu (2000) integrated various concepts of distance-learning to suggest a new framework and architecture for designing and developing networked computer based integrated educational systems'. According to this concept, a model is presented for varied levels (small-, middle-, or large-scale) to integrate education systems that would include tools for collaboration and serve various functions, including administration; management of the curriculum; preparation of online courses; creation of quizzes, exercises and texts; practice experiments, etc. This model also provides graphical images to suggest virtual classrooms, virtual collaboration rooms, virtual laboratories, virtual administration offices, virtual private offices at the room layer, at the tool layer; and various tool kits facilitated the above (p. 114). Spaulding (2002) comments, 'It is an interesting model that tries virtually to duplicate a traditional academic institutional environment in cyberspace that, nonetheless, would meet much resistance among traditional academics.' (p. 122). The article concludes that there are more "intertwined activities beyond just teaching and learning courses in schools and universities. It is an important research direction to develop a standard and unified integrated educational system for systematically supporting all activities in virtual schools and universities of the future" (Spaulding, 2002) (p. 136).

Agarwal and Day (2000) describe a model for instruction in distance-learning called the Learning-by-Objective (LBO) model which integrates various Internet tools for knowledge transmission, communication, and assessment of learning. Courses developed in the LBO framework range from Web enhancements of traditional course offerings to partial and complete substitution of in-class time in distance-learning courses. The premise behind the LBO model is that students learn best when the information provided to them is in small, self-contained modules that allow them the maximum ability to learn actively "hands-on." The authors use the 3-P principle (preparation, practice, and performance) for each objective identified in each chapter to develop modules. Each module contains the following components: (1) Objective: the learning outcome to be accomplished; (2) Preparation: reading the relevant pages in the text, additional Web-based supporting material that may include links to news sites and case studies, a list of important relevant points; (3) Practice: using the concepts to solve a problem or apply to a particular case study. This may require critical thinking and analysis of a related Web link, or discussion on the bulletin board on the issue; and (4) Performance: a non-graded self-test allows students to test their understanding of the concepts before a required online graded quiz.

Using the LBO model the authors developed introductory micro and macroeconomics course web sites with the instructional software Web CT, which provides student access in a password-protected environment within which student work is identifiable. Each LBO component is achieved through an integration of the various tools of communication (e-mail, forum or bulletin boards, online chat), knowledge dissemination (module, textual references, and Web links to related sites) and assessment (self-test, graded quizzes, Web-based assignments). Tools such as

grade books, calendars glossaries aid in ‘house-keeping’ tasks (Agarwal & Day, 2000). The above models have been developed based on analyses of students’ needs and course requirements and are useful to inform the design of distance-learning programmes. However, for the purpose of informing the research design of this PhD study, the following section considers models developed from reviews of previous research evidence to show links between relevant variables such as ones in Higher Education (Entwistle, 1997), Teacher Education (Shulman, 1986) and Technological, Pedagogical, Content Knowledge (TPCK) models (Mishra & Koehler, 2006).

3.2 Pedagogical Models

The term ‘pedagogical model’ is used to represent the teaching–learning process within an educational system, be it primary/secondary school, higher education or distance-education. It refers to the relationship between various factors involved in an instructive process to depict the pedagogical process which influences the learning outcome of the student. Pedagogy is defined as: “the activities of educating or instructing or teaching; activities that impart knowledge or skill” (hyperdictionary). Pedagogy is the theory of teaching from which appropriate uses of instructive strategies are developed. These instructive strategies are shaped by the teacher's own philosophical beliefs of instruction and governed by the pupil's back-ground knowledge and experience, situation, and environment, as well as learning goals set by the student and teacher. The three models discussed below look at different variables within the process of teaching and learning. All three models have been examined and the model best suited for understanding the present research problem, namely perceived barriers of dental practitioners to CPD courses via

distance-learning was selected for further analysis and interpretation and to provide the basis for the research design.

3.2.1. Schulman's Pedagogical Model (1987)

Shulman (1987) proposed a pedagogical model for prescribing the knowledge a teacher must possess and reasoning that he/she should do in order to teach effectively. His paper starts by describing the content, character and sources for a knowledge base of teaching and then provides a model for the teaching act itself. This model is reviewed here to understand the teaching-learning process in a distance-learning situation.

Shulman built his model of teaching based on the observation of expert teachers and neophyte teachers and analysed the knowledge and skills/strategies used by them. His studies of teachers showed that the knowledge, understanding and skills displayed among beginners were often still limited and lacking confidence compared with being demonstrated with ease by the experts. His exercise to develop a national board assessment for teaching helped him identify the sources and outline a knowledge base for teaching. This paper was to develop a knowledge base for teaching and for the professionalization of teachers in teacher training.

Shulman categorized 'knowledge' that the teacher has to have to promote comprehension among students, namely content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational contexts, and knowledge of educational ends, purposes, and values and their philosophical and historical grounds. Going further, he then classified the sources for this knowledge base into four major sources: 1) scholarship in content disciplines, 2) the materials and settings of the institutionalized educational process which includes curricula, textbooks,

school organizations and finance, and the structure of the teaching profession; 3) research on schooling, social organizations, human learning, teaching and development and the other social and cultural phenomena that affect what teachers can do and 4) the wisdom of practice. Having classified the sources of knowledge Shulman then enlisted how the teacher actually uses this knowledge in order to teach (Shulman, 1987). See Table 3.1 below.

Table 3.1 Shulman's Model of Pedagogical Reasoning and Action (Shulman, 1987)

COMPREHENSION

Of purposes, subject matter structure, ideas within and outside the discipline

TRANSFORMATION

- ***A.*** Preparation: Critical interpretation and analysis of texts, structuring and segmenting, development of a curricular repertoire, and clarification of purposes
- ***B.*** Representation: Use of a representational repertoire which includes analogies, metaphors, examples, demonstrations, explanations and so forth
- ***C.*** Selection: Choice from among an instructional repertoire which includes modes of teaching, organising, managing and arranging
- ***D.*** Adaptation and tailoring to student characteristics: Consideration of conceptions, preconceptions, misconceptions, and difficulties, language, culture, and motivations, social class, gender, age, ability, aptitude, interests, self concepts and attention

INSTRUCTION

Management, presentations, and interactions.

EVALUATION

- ***A.*** Checking for student understanding during interactive teaching
- ***B.*** Testing student understanding at the end of lessons or units
- ***C.*** Evaluating one's own performance, and adjusting for experiences

REFLECTION

Reviewing, reconstructing, re-enacting and critically analyzing one's own and the class's performance, and grounding explanations in evidence

NEW COMPREHENSIONS

- ***A.*** Of purposes, subject matter, students, teaching, and self
- ***B.*** Consolidation of new understanding, and learning from experience

Shulman explained these processes elaborately and also clarified that these steps were not meant to represent fixed stages, phases or steps. He says many of the processes can occur in a different order. Some may not occur at all during some acts of teaching, some may be truncated, and others elaborated. In elementary teaching, for example, some processes may occur that are ignored or given short shrift in this model but a teacher should demonstrate the capacity to engage in these processes when required. This model, in spite of having drawn criticisms (Wood, 2006; Maffei and Meredith, 1995) is still a valid model for the analysis of the teaching act and stresses the importance of pedagogical content knowledge that unique understanding of pedagogy and content that makes a teacher effective and distinct from a pedagogue or a content specialist.

According to this model, knowledge can be developed only by observation, documentation and imbibing the practice of experts. He also cautions against rigid orthodoxies and an overly technical approach to the knowledge based approach. However, it has also provided a widely used basis for researching into technology enhanced learning in many sectors of education (Webb and Cox, 2004; Law, 2008). According to the model, the teaching and learning ways in distance-learning are that the teacher's comprehension of subject matter may be replaced by that of the course developer's. Transformation of the content would include developing learning materials for individualized instruction (texts, self-learning materials, CD-ROMs, videotapes). Instruction could be modified according to the mode of interaction - face-to-face/use of video/audio-tapes or television broadcasts/online interactions. The evaluation process could also be modified to checking for understanding during the interactive teaching process.

3.2.2 Technological, Pedagogical, Content, Knowledge Model [TPCK] by Mishra & Koehler (2006)

In this model Mishra and Koehler discussed the need for a technological pedagogical knowledge for understanding teacher's knowledge. In this model, the authors introduce another category of knowledge, 'technology knowledge' as a dynamic knowledge, which the teacher constantly needs to update.

> "Technology knowledge (TK) is knowledge about standard technologies such as books, chalk and blackboard, and more advanced technologies, such as the Internet and digital video. This involves the skills required to operate particular technologies. In the case of digital technologies, this includes knowledge of operating systems and computer hardware, and the ability to use standard sets of software tools such as word processors, spreadsheets, browsers, and e-mail. TK includes knowledge of how to install and remove peripheral devices, install and remove software programs, and create and archive documents." (p. 1027).

This knowledge, they claim cannot be viewed as a separate entity but has to be integrated into the knowledge of content and knowledge of pedagogy.

There are four kinds of integrated knowledge that evolve as a result of this overlap. They are Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), Pedagogical Content Knowledge (PCK) and Technological Pedagogical Content Knowledge (TPCK). Mishra and Koehler defined TPCK as the basis of good teaching with technology and requires an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge

and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones. The three circles shown in Fig. 3.1, Content, Pedagogy, and Technology, overlap to lead to the four kinds of interrelated knowledge discussed above (Mishra and Koehler, 2006).

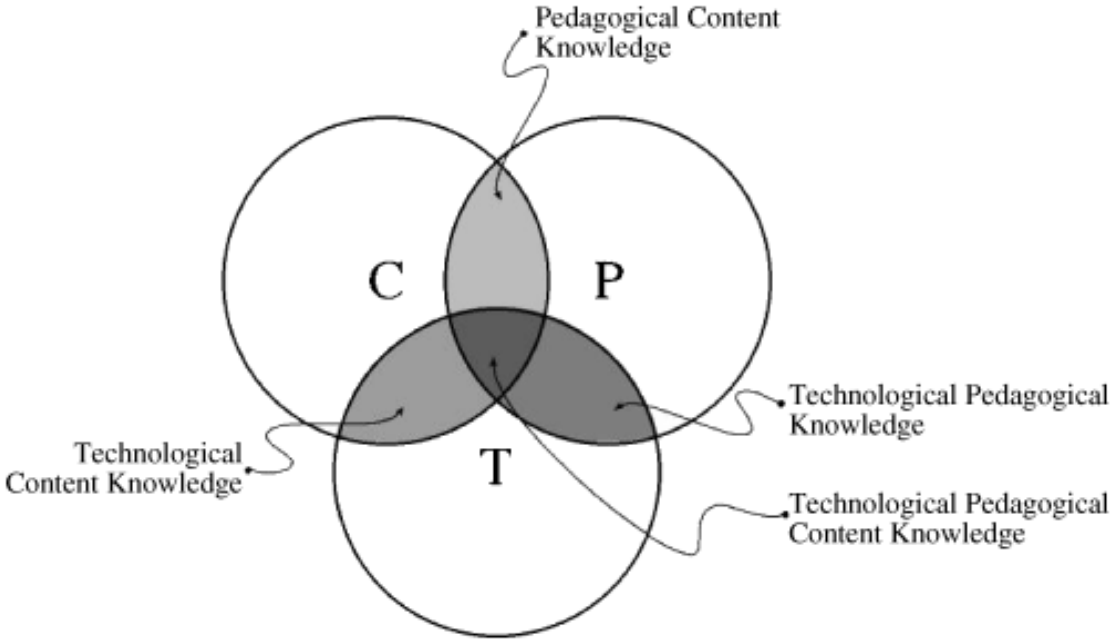

Figure 3.1 Pedagogical Technology Content Knowledge – The three circles, Content, Pedagogy & Technology overlap to lead to four more kinds of Inter-related knowledge (Mishra and Koehler 2006)

The authors point out that policy makers, teacher educators do not completely understand the interplay of these categories of knowledge and assume that if a teacher is trained in technology, they would be able to apply this knowledge immediately to the classroom in their teaching. Having explained their model, Mishra and Koehler explain how they developed a course in educational technology to train teachers to develop this kind of integrated knowledge. They called this learning-technology by design. In this model, teachers actually learn to develop courses using technology. They believe that design-based activities provide a rich context for learning and lend themselves to sustained inquiry and revision, and are

well suited to help teachers develop the deep understanding needed to apply knowledge in the complex domains of real-world practice. They gave three examples where students taking a master's course in educational technology used this approach to design and evaluate artifacts designed by the other groups. The first example dealt with a project of making a video film on topics like the role of technology in the library sciences, effective online communication, and appropriate uses of technology.

Mishra and Koehler stated that instead of learning the de-contextualized skill of creating and editing digital video, the teachers learnt the technology within the context of communicating their understanding of larger ideas that formed the basis of their own practice. They described the learning environment in these courses. According to them, the students who participated in these design courses spent most of their time in groups discussing or debating their idea, storyboarding, filming, digitizing, editing, revising, and soliciting feedback. The classrooms were quite different from the traditional classrooms and teachers were spread to other rooms of the school, the hallway, outside, and any other place that they could find room to talk, film, edit, storyboard, discuss, screen, and preview video. These activities went well beyond class time, and teachers' worked late into the night and through the weekends in the lab and in their dorms (Mishra and Koehler, 2006).

The learning activities included skills such as learning to operate digital cameras (still and video); using video and image editing software (iMovie, Adobe Premiere, and Adobe Photoshop); conducting Internet searches and uploading and downloading files via FTP (File Transfer Protocol) or other means; and designing Web pages using software such as Dreamweaver or FrontPage. Apart from these specific skills, teachers also learned key concepts in information technology, such as

Internet protocols, file formats and structure, and video compression technologies (codec's). More important than acquiring individual technology skills, was learning about the subtleties and relationships between and among tools, actors, and contexts. Technology was learned in the context of expressing educational ideas and metaphors. Teachers learnt a lot about how to focus a message in just two minutes of video, let images and symbolism convey ideas in an effective manner, inspire audiences, work together in groups, give and receive feedback, and communicate with audiences.

The second example given by Mishra and Koehler is a course where participants were expected not only to learn interactive Web-based technology but also to generate abstract knowledge about designing educational technology through working in groups on four different design projects. Participants in this course were involved in the redesign of existing Web sites or Web resources by engaging in activities that compelled them to seriously study technology, education, the interface between the two, and the social dynamics of working with others. This emphasis on redesign was to ensure that the participants would not spend a lot of time researching the topic but instead would focus on key issues related to content, pedagogy, and technology. The technologies learnt by participants in this course were QuickTime VR, JavaScript, Web-based databases, and a variety of site building and image manipulation tools by studying manuals, talking to each other, talking to the instructor, and seeking out other locally available experts. The participants also had to think deeply about evaluating the needs of the audience and to configure their design to meet these needs.

The third example was that of developing an online course. Students on a master's level course had faculty members as part of their teams. They worked as a

team and each team consisted of one faculty member and three or four master's students who worked together to design an online course to be taught by the faculty member the following year. The teams explored different aspects of online learning such as providing audio feedback to students, using PowerPoint presentations via the Web to offer overviews of the lessons to be covered, developing techniques for creating a learning community online, and strategies for problem-based learning, effective Web page design and issues of copyright, intellectual property, and privacy. Using systematic methods such as case studies of the design teams, quantitative and qualitative analysis of discussions by a trained researcher and surveys, the authors deduced that as a team works through a design-experiment their knowledge develops through stages of integration of two areas of knowledge at first such as PCK, TCK and TPK and progresses to form an integrated TPCK amongst the participants.

TPCK thus becomes a theoretical framework within which to describe, analyze and design technology-mediated learning programmes. The authors discussed the usefulness of TPCK as a theoretical framework as follows: 1) to make sense of the complex web of relationships that exist when teachers attempt to apply technology to the teaching of subject matter; 2) to make predictions and inferences about contexts under which good teaching with technology would occur; 3) to design better learning contexts and systems; 4) to bridge the gap between good theory and design; 5) to critique simplistic approaches toward developing better learning environments; 6) they argued against teaching technology skills in isolation and supports integrated and design-based approaches as being appropriate techniques for teaching teachers to use technology; and 7) provide a framework for analyzing teacher knowledge. The authors concluded by saying that this model considers how

content, pedagogy and technology dynamically co-constrain each other, and summarized by saying that they believe TPCK to be a goal of teacher education. They used the words of Shulman to sum up their ideas ‘ not to indoctrinate or train teachers to behave in prescribed ways, but to educate teachers to reason soundly about their teaching as well as to perform skillfully’ (p. 1029).

Mishra and Koehler introduced the concept of TPCK as an integrated knowledge that teachers must possess for teaching with technology and gave a tested method, design-experiment method for training teachers to teach with technology. They also described the potential scope of this theoretical framework for research, design and training of teachers in the field of educational technology. However, they did not give specific suggestions as to what processes were involved in designing or teaching with technology as was given by Shulman (1987) for example. They also did not use a cyclic process as suggested by Shulman where evaluation and reflection were followed by further comprehension during the teaching process. However, their conceptual understanding was based on practice and was of great value for designing courses, training teachers and for evaluating courses in the distance mode. This model is relevant to the current study because it underpins the ways in which online learning programmes should be designed and delivered to take account of the interface between the components of TPCK.

An understanding of the students’ conceptions about learning is equally important in designing courses effectively in distance mode. Entwistle (2004) developed a pedagogical model which included institutional factors relating to students’ approaches to learning and their study behaviour and preferences for different kinds of instruction. Their model is presented briefly below in the following section (Entwistle, 2004).

3.2.3 Entwistle's Model for Higher Education (2004)

Entwistle (2004) surveyed 12 departments delivering Higher Education programmes to identify the factors which would influence the design and delivery of Higher Education courses. "Our research design envisaged the collection of various kinds of data that could be used to draw conclusions about the extent to which teaching-learning environments supported student learning effectively". (ibid., p. 5) . They began by introducing students' conceptions of knowledge and how these change over time as students progress in higher education. Based on the idea that what students believe about learning overlaps with what they hope to achieve from being in higher education, conceptions of knowledge and learning are linked to approaches to learning and learning orientation (Entwistle, 2004). Beaty, Gibbs and Morgan (1997) introduced the term 'learning orientation' and defined it as all those attitudes and aims which express the student's individual relationship with a course of study and the university. It is the collection of purposes which form the personal context for the individual student's learning and may be classified as academic, vocational, personal and social. Summarizing these variables, the authors concluded that students' conceptions of knowledge, conceptions of learning and learning orientations develop and change during the learning process and within different learning environments. They reviewed a range of empirical studies which linked student learning specifically to study behaviour (Beaty, Gibbs & Morgan, 1997).

Entwistle (2004) referred to the work of Marton and Saljo (1997), who were interested in what the students came to understand from reading an academic text, and how students went about that type of reading. Marton and Saljo, in their experiment, asked students to read the article in their own time and in their normal manner, followed by questions about it afterwards. They found that students who did

not get ‘the point’, failed to do so simply because they were not looking for it, so they introduced the concept of deep and surface levels of processing. The term approaches to learning was thus introduced to signal how intention and process were combined in students’ learning. Three approaches were given on this basis: deep approach, surface approach and strategic approach (Marton & Saljo, 1997). The authors then reviewed a study by Ramsden and Entwistle (1981) which involved interviewing students as to how they went about their everyday studying; taking notes in lectures, writing essays or problem solving, and preparing for examinations. The authors found that students’ approaches to learning are not only linked to direct tasks such as reading a particular article but also to their general study habits (Ramsden & Entwistle, 1981).

Entwistle & Peterson (2004) then followed it by the study of regulation strategies identified by Zimmerman and Schunk (1989) and Zimmerman (1990). They identified two methods, namely self-regulation and external regulation to support the larger model developed by Vermunt (1995). In Vermunt’s model conceptions or mental models of learning, learning orientations, study regulation strategies and processing strategies were all linked to arrive at four prototypical processing strategies or ‘styles’. The styles were named as, meaning-directed, reproduction-directed, application-directed and undirected (Vermunt, 1995). A gradual build up of concepts which subsume other smaller concepts was done and presented in tables (Entwistle, 2004). After using several qualitative studies which had established the relationship between those variables, Entwistle & Peterson (2004) endorsed these observations with the support of three quantitative studies to establish relations between these variables by using analysis on three scales namely, ASSIST (Approaches and Study Skills Inventory for Students; Tait, Entwistle &

McCune, 1998), Inventory of Learning Style (Vermunt, 1998) and the RoLI (Reflections on Learning Inventory; Meyer, 2004). The three inventories all show a clear linkage between conceptions of learning and approaches or cognitive processes of learning.

The ASSIST inventory contained items that asked students to indicate their preferences for different kinds of teaching and assessment (those thought to induce deep or surface learning). Students preferred courses and teaching approaches that were in line with their own approaches (Tait et al., 1998, Vermunt, 1998). Entwistle and Peterson (2004) stated that "taken together, these three studies indicated that a conception of learning as transforming or constructing knowledge, or seeing things differently (RoLI), is associated with an intrinsic academic or personal orientation, self-regulation and thinking independently (RoLI)" (p. 419). Conception of learning was also linked to holist and serialist cognitive processes, which focused on the development of understanding with memorising taking place either with or after understanding (RoLI). They also found an equally strong linkage leading from a conception of learning as the intake of fact-based, fragmented knowledge (RoLI), through an extrinsic, certificate orientation, or learning as a sense of duty (RoLI), to external regulation, and processes that imply surface, step-wise learning relying on rehearsal (RoLI) and routine rote memorizing (Entwistle, 2004).

Entwistle and Peterson (2004) found that a set of constructs and categories in their study showed how the extremes of each classification flowed towards equivalent levels of understanding. These were based on analyses of students' descriptions of their preparation for final examinations (Entwistle, 2000) and exhibited a direct link with approaches to studying and study behaviour.

The ‘conception of instruction’ was included based on the work of Elen and Clarebout (2005), who describe instructional conceptions as generalized ways in which students come to view the learning environments they encounter. The authors point out that the literature on student learning has concentrated on conceptions of learning, study behaviour or approaches, and on the more context-specific area of perceptions of teaching. Finally, based on the work of Lowyck and his colleagues (Elen and Clarebout, 2005) their conceptual framework showed the relationship between conceptions, perceptions and learning activities and another similar framework. The final model is outlined below (see Fig. 3.2).

Figure 3.2 shows the expected influences on the quality of student learning with most of the links having strong empirical support while some still remain tentative. The top half of the figure describes student characteristics and indicates the relationships found between prior knowledge, conceptions, approaches, levels of understanding, and perceptions of the teaching–learning environment. The bottom half of the figure suggests how the design and content of the teaching–learning environment is constructed to support quality learning. Having described the variety of influences on student learning in higher education, the authors gave a list of specific activities which would support the high-quality learning required as outcomes from a powerful learning environment.

Teachers can use this list to construct curricula which provide for understanding in students. This list given below is equally relevant to make online learning environments more challenging (Enwistle, 2004, p. 2) to:

1) Provide generative topics and understanding aims, and regularly remind students of them;
2) Relate teaching directly to prior knowledge and to the ‘understanding aims’;

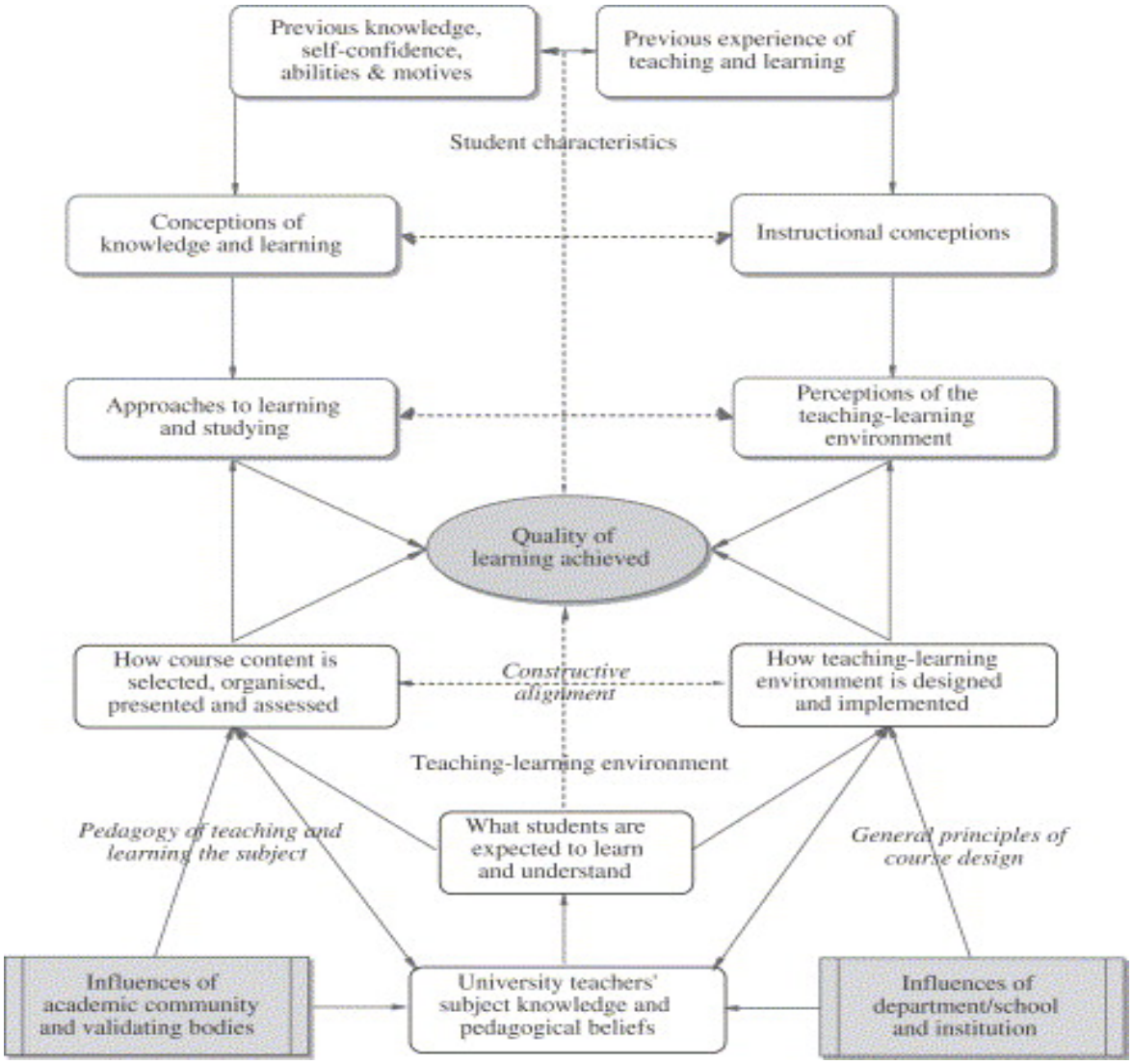

Figure 3.2 Conceptual framework showing influences on student learning (Entwistle, 2004)

3) Identify troublesome knowledge and threshold concepts;
4) Teach so as to clarify meanings and arouse interest for students of contrasting abilities and goals;
5) Provide extensive, carefully selected examples to develop accurate concepts;
6) Encourage reflection, meta cognitive alertness, and self-regulation in studying;

7) Provide opportunities for group discussion of both content and learning processes;
8) Introduce formative assessments designed to develop understanding and provide timely feedback;
9) Develop and make explicit marking criteria describing levels of understanding more precisely;
10) Use assessment techniques that encourage and reward conceptual understanding;
11) Create constructive friction within the learning environment to encourage development;
12) Ensure constructive alignment of aims with teaching, assessment student support.

3.3 Conclusions to the review of Educational Models

A brief summary of the conceptual understanding of the various models to consider their suitability to understand the perceived barriers to the take up of distance-learning is given below. The first model by Shulman (1987) comprised a pedagogical model for prescribing the knowledge that teachers must possess and reasoning that he/she should carry out in order to teach effectively. He gave an account of the sources of knowledge and how the teacher actually uses this knowledge in order to teach. He cautioned that a knowledge-based approach should not produce an overly technical image of teaching and a scientific enterprise that has lost its soul.

The second model which was considered, the Technological, Pedagogical, Content, Knowledge Model [TPCK] by Mishra and Koehler (2006) identified the need for a technological pedagogical knowledge for understanding teacher's

knowledge in distance-learning and they introduced another category of knowledge called ‘technology knowledge’ as a dynamic knowledge which the teacher constantly needs to update. They claim that this knowledge cannot be viewed as a separate entity but has to be integrated into the knowledge of content and knowledge of pedagogy and as a result, there are four kinds of integrated knowledge that evolve as a result of this overlap.

The authors argued that technology drives issues of content and pedagogy and not vice versa in a technologically controlled learning environment. The main drawback was that it did not give specific suggestions as to what processes were involved in designing or teaching with technology nor of the wider influences of the institutions themselves and the programme development. This model was not of direct relevance to our current study, as it did not focus on student learning as much as it does on teaching. An understanding of the relationship between the students’ conception of learning and intrinsic academic or personal orientation is equally important in designing courses effectively.

Finally, Entwistle (2004) described student characteristics and indicated the relationships found between prior knowledge, conceptions, approaches, levels of understanding, and perceptions of the teaching–learning environment.

He also suggested how the design and content of the teaching–learning environment could be constructed to support quality learning and the different institutional factors which might affect the impact on learning. This model described above gave a conceptual framework for understanding student approaches to learning and their preferences for teaching. It also gave a thorough understanding about different learners and their preferences for learning in higher education. Understanding and higher order thinking can be fulfilled by stimulating thought by

providing challenging content. This model would be useful to understand student preferences within a distance-learning set up as well. As Entwistle's model was more comprehensive in approach in order to understand students' approaches to learning and their preferences in higher education, it was chosen as a framework for this PhD study to help identify the variables which need to be measured to enhance our understanding of the barriers to distance education.

The methods used to conduct this PhD study drawing on this model are discussed in the next chapter.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 The Purpose of the Research

The aim of this PhD research, as explained in Chapter 1, was to find out the factors that encouraged or discouraged professional dentists to take up CPD. Furthermore this research also aimed to determine any barriers that existed for the uptake of such programmes, how distance education programmes could be used as a means to overcome such barriers. Accordingly, in line with these aims, two specific research questions were proposed (see Chapter 1, Section 1.3):

1) What were the most important factors which encouraged and enabled professional dentists to follow CPD through distance education courses?
2) What were the barriers which prevented them from continuing with their professional development?

This chapter presents the design and methodology utilized in the current study starting with a brief review of the historical context followed by a detailed description of the methods adopted. Ethical approval was granted for this research by the King's College London Ethics Committee, ref: (CREC/06/07-222) in September, 2007. The purpose of the project was explained to all the subjects who were asked if they were willing to complete the questionnaires in each survey and their responses were anonymised before the data were compiled for presentation in this thesis. Their original identities have been kept confidential to the researcher.

4.2 The historical Context

As explained in Chapter 1, for many years lifelong learning for dentists has been contemplated in various countries such as the UK, USA, Australia, and India to name a few. The Bachelor degree obtained at college is no longer considered

sufficient for continuing practice and patient care. As shown in Chapter 2, distance education (E-learning) can provide a viable solution and an alternative way to continue professional development. However, the factors that would either encourage or discourage distance education (especially E-learning for professional dentists) are not widely known and as explained in Chapter 2, there are different reasons identified from previous research as to different barriers occurring for students, teachers, curricula, and organizations. These barriers ranged from financial barriers, decreased motivation, problems with accessing courses, to organizational and structural factors (see Chapter 2, Section 2.2). Discouraging factors are referred to in this thesis, and from previous researchers, as barriers and as explained above, a major part of this investigation has been to determine what factors were the most important regarding the uptake of CPD in dentistry. Furthermore there was also a need to understand the effectiveness of various course designs in improving professional practices and knowledge to benefit those participating in such CPD programmes.

At the time of starting this study, India provided a natural setting for investigating the proposed questions. Firstly, India is the seventh largest nation in the world with wide geographical variations which might affect the uptake of distance-learning CPD. Secondly, it has been at the hub of the information technology revolution and therefore professional dentists could be expected to have sufficient IT resources to be able to follow an online distance-learning course compared with many other developing countries. Thirdly, a significant number of professional dentists were following a Masters in Clinical Dentistry which provided an initial sample for the pilot study and for the main phases of the research. The first two of these factors had already resulted in the development of a range of courses offered

across the country from various universities, although little was known about the possible barriers. It has already been shown from previous evidence that where previous researchers have investigated barriers to E-learning in general there were no concrete efforts in either understanding or knowing barriers that existed for practicality of a highly technical skill like dentistry. Previous research reviewed in Chapter 2 to understand the same from the perspective of health professionals (see Section 2.2.2,' Barriers to E-learning for health professionals') showed that costs, poorly designed programmes, inadequate technology, lack of skills, absence of face-to-face learning acted as barriers. However, the research done previously did not cover professional dentists nor did it answer the proposed research questions for this PhD study (see Section 4.1). The following section presents the design adopted, the phases involved, and the methodology involved in collecting and analyzing the data as empirical evidence to find answers for the proposed questions.

4.3 Research Design

The research was conducted in three phases informed by an ongoing literature review. The first phase of the study was a pilot questionnaire (Q1) survey to determine the range of questions and their validity and the initial responses for a small sample of professional dentists following a Masters' programme. The second phase of the study consisted of two further surveys using questionnaires, Q2 and Q3 that were used to collect data from the target groups of professional dentists working in India (see Appendices 3 & 5). During this phase, relevant issues were identified which needed to be investigated further in the third and final phase of the study. In the third phase, the final questionnaire Q4 (Appendix 6) was designed and utilized to collect data using stratified random sampling with proportional allocation from 201

dentists. The results were analysed and interpreted to address the research questions discussed above in Section 4.1 and in Chapter 1, Section 1.3.

4.4 Strengths of Previous Research Methods

The first research aim of this PhD study was to determine from previous evidence what factors either encouraged or discouraged professional dentists from the uptake of distance education courses. The main findings from the literature review have been presented in Chapter 2. This section identifies the strengths and weaknesses of previous research methods in researching distance education. As detailed in Chapter 2, the five major instruments for the evaluation of distance-learning courses identified from an analysis of previous studies were:

1) Through exams, quiz, audit etc.;
2) Conducting large scale surveys;
3) Case Studies;
4) Ethnography and folklore studies;
5) Pre-test and Post-test design.

The first of the above methods applies to evaluations of students' learning where they were already following a distance-learning course. This was therefore not relevant to this PhD research.

The second method; Quantitative Surveys are one of the most common methods of data collection in distance education for determining the uptake by professionals. The survey method used by Fozdar and Kumar (2007) is of particular interest to this study as it was used to study students' perceptions and attitudes to mobile learning before they actually embarked on a distance-learning course. Surveys may also be used to evaluate the success of ongoing projects to get information about learner satisfaction, teacher/instructor characteristics, and use of technology, success of

delivery technology or all of the above. Uzunboylu, Cavus and Ercag (2009) also conducted a survey using a questionnaire for collecting information regarding the usefulness of mobile learning systems from a sample of 20 male and 21 female undergraduates enrolled in computer education and instructional technologies classes at the Near East University in North Cyprus.

The third, Case Study method was also identified as an important research method to provide qualitative information about specific projects/institutions (Duncan, 2005). The findings of his study showed how working professionals prioritized the learning time they had available and that as adult learners, this online experience was made meaningful not only by its convenience and flexibility but, more importantly, through the opportunity to engage with content, to increase technological skills, and to reflect and conduct dialogues with peers on issues and concerns that were relevant to their professional lives.

The fourth method was Ethnography and Folklore studies which involves the evaluation of the development and delivery of courses such as the Master's level Library Experimental Education Programme (LEEP) (Friesen, 2005).

The fifth consists of a Pre test-post test design used by many researchers and educators: e.g. Harris, Salasche and Harris (2001), which is mainly used for measuring the impact of the course on students' understanding.

The above five methods can be used individually or in combination to obtain data to evaluate any distance education programme. However, the purpose of this PhD research was to investigate the barriers and facilitators to the uptake of distance-learning so the most appropriate method as used by other previous researchers like Fozdar, Kumar and Kannan (2006) (e.g. see Section 2.1.4 of Chapter 2) was the survey method for the following reasons:

1) A large number of subjects were needed to obtain sufficient data from different geographically located sub-samples.
2) The range of variables which needed to be measured required a quantitative method.
3) The researcher was based in the UK so needed a method which could be done mostly by post at a distance.
4) The other methods mainly applied to evaluating existing courses and their impact on student learning.
5) A case study approach, although sometimes providing richer insights, would not be generalizable to other contexts and professions.

4.5 Phase 1 – The Pilot Survey

In order to gather data regarding distance education, a pilot survey questionnaire (Q1) (see Appendix 1) consisting of 9 items, was designed based on the known variables from previous research (see Chapter 2) to find out the perceptions of dental graduates towards distance education, its quality, associated costs, impact on their time and effectiveness etc. Questions included asking how students got to know about distance education programmes, their rationale for choosing such programmes over in-house programmes, whether they were full-time or part-time students, their interest in clinical training attachment, the international status of King's College London (which was running the programme), access to on-line courses, constraints of family life and so forth. Analysis of the results showed the individual reliability and relevance of each item resulting in modifications to improve the instrument for the second phase. The sample (see more details in Appendices 1& 2) for this pilot survey consisted of 23 dental graduates attending a

residential component of an online MClinDent programme in the UK in their first year.

4.6 Phase 2: The 2nd and 3rd Questionnaire Surveys

Any questionnaire that was to be used in India which was our geographical area of study had to be more comprehensive and incorporate quantifiable statistical values. The next two questionnaires were designed based on feedback from the pilot survey and the factors identified from the variables identified for impact in higher education by Entwistle (2004).

4.6.1 Phase 2 - Questionnaire 2 (Q2)

Q2 (shown in Appendix 3), based on feedback from Q1, incorporated various factors to find out the influence of age, gender, area of specialization, experience, proficiency with computers, and accessibility to the Internet on uptake of distance education courses. The second part of the questionnaire was designed to investigate the mandatory requirements to continuing education, time invested in continuing education after obtaining a degree, willingness to travel, and interest in courses with an online component.

Section one: Background information:

1) Age of correspondents;
2) Gender;
3) Qualifications;
4) Time since finishing first dental degree;
5) Current working area;
6) Access to the Internet;
7) Utilization of the Internet to obtain professional data.

Section two: Continuing Professional Development

1) Mandatory requirement to undertake post-graduate study for continuing registration at the Indian Dental Council;
2) Approximate study days undertaken after BDS (1st Dental degree);
3) Previous participation in a course with an online component;
4) Interest in a course with an online component for delivering theory;
5) Preparedness to travel to attend practical classes and distance willing to travel;
6) Willingness to consider a course that could be completed at home;
7) The importance of continuing one's dental education.

The factors that influenced the individuals to consider online courses were assessed using 14 criteria, questions pertaining to post graduation under 11 criteria, and factors to consider while choosing a course under 5 criteria. The questions were based on a five point Likert scale where 1=strongly disagree, 2=disagree, 3-uncertain, 4=agree, and 5=strongly agree. Questionnaire (Q2) was distributed at the Maulana Azad Dental School, New Delhi, at a seminar. There were 23 delegates and the group consisted of post-graduate dental students, dental teachers, and academicians who were visiting to examine for the final BDS examinations for the College, but no practising dentists who were actually the main purpose of this study. The results were therefore statistically limited and could not be generalized to a larger section of practising dentists or dental organizations.

Descriptive statistics involving frequency tables and cross tabulations were applied to analyze the data from this questionnaire as presented in Chapter 5. Based on the information obtained from Q2, Q3 was then designed and administered.

4.6.2 Phase 2 - Questionnaire 3 [Q3]

For accurate statistics, the responses obtained from the sample of dentists should be free of bias to the extent possible where all the members of the population have an equal chance of being included. This can be achieved by comparing the proportions of different categories of dentists included in the sample to the proportions in these categories in the general population. However, like in any sample, in this case too it was quite likely that a bias had been introduced into the sample by the inclusion of many more dentists employed in a University context than working in general practice, and more younger than older dentists. This would affect the results obtained: any differences observed between respondents employed in different types of workplace, and of different ages, should be given particular attention.

The aims of the Q3 survey (Appendix 5) were to ensure that the constituted sample was representative of the chosen population of the study. It was therefore decided that the questionnaire would be distributed in three different colleges and the range of items included in Q3 (see Appendix 5) were extended from Q2 to take account of the different cohorts to be surveyed. Each college was assigned into three separate groups, namely:

I. Group 1: 23 post-graduates and teachers at the Maulana Azad Dental School (Delhi);
II. Group 2: 70 dental graduates, post-graduates and teachers at Dharwad Dental School (Karnataka);
III. Group 3: 23 general dental practitioners who attended a post-graduate course at Goa Dental School.

The sample size as shown in Table 4.1, below, considered for Q3 was considerably larger and heterogeneous including private practitioners. The responses were split into two categories for analysis: respondents' attitudes to CPD and their preferred means of acquiring it. Reference was made throughout the analysis to the characteristics of respondents and any possible influence of these on their responses. There were four additional options under Section 2.12 that were added to Q2 to construct Q3 (see Appendix 5). The questions were regarding the preference of correspondents and the options were:

i. One year online and hands on course leading to a Certificate (60 EU credits);
ii. Two year online and hands on course leading to a Diploma (120 EU credits);
iii. Three year online and hands on course leading to a Masters (MSc) Degree (180 EU credits);
iv. Four year online and hands on course leading to a Masters in Clinical Dentistry Degree (360 EU credits).

The analysis of Q3 responses (see Chapter 5) led to the conclusion that in general, the view of CPD was very positive, with respondents recognising its benefits for their careers, profiles among their fellow professionals and for keeping up to date. Most respondents were early in their careers and seemed committed to CPD, with over half spending more than 20 days a year on study. CPD was considered especially important to those working in general practice. The responses to Q3 provided a comprehensive insight into the general perspective about CPD with its advantages in career progression and updating information. As one of the main purposes of this PhD study was to assess the attitudes of general practitioners towards CPD, the statistics drawn from the research should be applicable to general dental practitioners. Therefore it was vital to select an unbiased sample of the latter.

In order to achieve this it was decided that a further questionnaire survey should be conducted with general dental practitioners. Therefore questionnaire 4 (Q4) was prepared with further modifications in the final main phase of this PhD study which was administered to 201 dental practitioners.

4.7 Phase Three – Questionnaire 4 Survey

Based on the literature survey in Chapter 2 and feedback from Q3 it was possible to arrive at the conclusion that the background characteristics of learners such as gender and age does affect the uptake of an online course (see Chapter 5). Technological factors also influenced the uptake of CPD. Ability and confidence with online learning technology, learners' attitudes to CPD, their preference for subjects, teaching styles, teaching-learning environments which facilitated interaction among learners were found to be other factors which affected their learning in online environments. The results of the previous study based on Q3 were further analysed in this phase of the study and to inform the design of the final questionnaire Q4. The factors and their affects as perceived by the respondents that were included (see Q4 in Appendix 6) were:

i. Age, gender, time since graduation and work place;
ii. Access to high speed Internet and familiarity in using it for getting information affected the uptake;
iii. Other factors like travel time, familiarity with CPD courses and online courses affect uptake;
iv. What were the attitudes and preferences of dental surgeons towards the uptake of CPD through an online course?

v. Whether or not a learner opts for an online course with theory delivered through the Internet and practical component through face-to-face courses is determined by the learner's beliefs and attitudes to both these components.

The results from the Q3 survey showed that whether learners would actually consider an online course or not depended on several variables; namely, their perception of their ability to learn on their own, their preference for a particular mode of delivery, namely distance mode or Internet, access to high speed Internet, knowledge of using the Internet for accessing information and familiarity with online courses. Travelling and being away from home was also found to be important therefore information was also collected on each of these variables through specific questions in Q4.

The major changes that were incorporated into Q4 from Q3 were questions to find out the following:

1. Current area of employment;
2. Willingness and mode of transport to attend CPD;
3. More information pertaining to post-graduate education;
4. Willingness to travel to attend practical components of a course.

A chi-square test was performed to see the association between each of these factors and response to two questions:

1. "Would you consider a course which had an online component delivering theoretical aspects via the Internet directly to your computer? (Question 2.6)
2. "Would you be prepared to travel to attend the practical component of the course? (Question 2.8)

Moreover, a correlation matrix of attitudes and beliefs of the respondents towards CPD courses (Q 2.1) and perceived barriers in taking up an online course (Q

2.5, Q 2.6 and 2.8) were analysed to find out which factors stood out as the major factors. The details of this main phase sample and the previous phases are given in the following section.

As explained in the above sections the samples for the pilot (Q1) and (Q2) surveys were intentionally small; the purpose being to pilot the questionnaire firstly with a small group of post-graduate dental practitioners in the UK; and secondly, with a similar group in India. Table 4.1 shows the sample details for all phases of the PhD study for questionnaire surveys Q1 – Q4.

Table 4.1 Samples selected for Questionnaire Surveys: Q1 – Q4

Questionnaire	Number of students in the sample
Pilot questionnaire (Q1)	23 [MClinDent distance-learning programme, UK, to dental graduates attending residential component of MClinDent]
Questionnaire 2 (Q2)	23 [Maulana Azad Dental School, India, to post-graduate dental, dental teachers, and academics]
Questionnaire 3 (Q3)	116 [Group 1: 23 post-graduates and teachers at the Maulana Azad Dental School (Delhi); Group 2: 70 dental graduates, post-graduates and teachers at Dharwad Dental School (Karnataka); Group 3: 23 general dental practitioners who attended a post-graduate course at Goa Dental School]
Questionnaire 4 (Q4)	201 dental practitioners from 20 different Indian states

The sampling methods used for the Q1-Q3 surveys have been discussed above under the relevant sections. The sampling method for the main study, Q4, was a randomized stratified sampling method. A list of registered dental practitioners (as on 31st December 2006) was obtained from 'The State Dental Council of India'. The total number of registered dental practitioners was found to be 72,497, out of which it was estimated that 13,050 had post-graduate qualifications. That left a study population of 59,447 graduate dental practitioners. From this population, a sample of

201 dental surgeons was surveyed using stratified random sampling using proportional allocations. The stratification was done by breaking down the data into the 20 different Indian states. Keeping in mind the female/male ratio in the Indian population (933:1000) the sample was divided into a proportionate ratio. The questionnaire was distributed by hand delivery and collected back from the practitioners and the data entered. If during the delivery it was noted that the practitioner had a post-graduate qualification then the next person on the list was selected.

4.8 Analysis of Empirical Data

Descriptive statistics were used to analyze the data and validate the probable accuracy of the data. Care was taken that if the response rate for any question was below 90% a cautionary note was added alongside the findings (this was only the case for one question). A possible reason for a low response is that respondents found the question confusing, which also creates some uncertainty about the responses that were received. Individual questionnaires were also checked to find inconsistencies, for instance a statement that a respondent would prefer to avoid travelling abroad to obtain CPD, but has not answered the question of whether he or she has a preference regarding travel; in this case a "No" was inserted into the "No preference" box. In this way missing answers were filled in but no responses were altered. The question most affected by this action was question 2.7. The responses were split into two categories for analysis: Respondents' attitudes to CPD and their preferred means of acquiring it. Reference was made throughout the analysis to the characteristics of respondents and any possible influence of these on their responses.

Statistical significance tests can be used to measure the likelihood that the results obtained from the tested sample are representative of the whole population. In

general, the larger the sample the greater the detail level at which significant characteristics can be detected. Many features and patterns may be noted when examining a particular set of data, but it is necessary to carry out tests to determine whether these are statistically significant. To analyze the underlying factors of learners' attitudes towards CPD courses and their perceived barriers to taking CPD online course, analysis was performed using SPSS. It was ensured that the analysis of data was scientific and free of bias and the results obtained were empirical and statistically significant. In the next chapter, the results of the first phase of the study are presented.

CHAPTER 5: RESULTS OF PHASES 1 – 2 OF THE STUDY

This study sought to ascertain the perceptions of professional dentists towards distance education programmes for continued professional development. To facilitate this understanding, two questions as given in Chapter 4, were used to guide the research related to factors that encouraged dentists to adopt CPD through distance education courses and the different kinds of barriers that existed for the uptake of such courses.

5.1 Rationale for the Study

This chapter presents the results of the first two phases of the study which were described in Chapter 4. As reviewed in Chapter 2, background characteristics of learners such as gender and age had been previously found to affect the uptake of an online course. Technological factors had also been found to be another major barrier. Ability and confidence with online learning technology, learner attitudes to CPD, their preference for specific subjects, teaching styles, teaching-learning environments which facilitated interaction among learners were found by previous researchers to be other factors which affected their learning in online environments. This study was conducted to find out what factors affect the uptake of an online CPD course in dentistry in India. Evidence from previous studies had resulted in the following unanswered questions: Do factors like age, gender, time since graduation and work place affect the uptake of a course? Does having access to high speed Internet services and familiarity in using it for getting information affect uptake? Do factors like travel time, familiarity with CPD courses and online courses affect uptake? What were the attitudes and preferences of dental surgeons towards the

uptake of CPD through online courses? Also, the result from the questionnaire surveys discussed in Chapter 4 were analysed in this chapter.

According to the Theory of Planned Behaviour (as discussed in Chapter 1) a planned action depends on the intention to perform the action. Intention is again determined by the attitude towards that action (a weighing of advantages and disadvantages in performing that action), the subjective norm (what significant others think of them), and the perceived control of behaviour (whether the individuals perceive they have the resources and opportunities to perform the concerned action). Finally, whether a learner opts for an online course with theory delivered through the Internet and practical component through a face-to-face programme is determined by learners' beliefs and attitudes towards both these components.

Chi square tests were performed to test the association between the potential factors, such as their perception of ability to learn on their own, their preference for a particular mode of delivery, namely distance mode, access to high speed Internet, knowledge of using the Internet for accessing information and familiarity with online courses that may influence the learners to consider an online course with the response to the questions 'Would you consider a course which had an online component delivering theoretical aspects via the Internet directly to your computer'? (Q 2.6) and 'Would you be prepared to travel to attend the practical component of the course'? (Q2.8).

5.2 Phase 1 - Pilot Questionnaire (Q1) Results

Questionnaire 1 (Q1) (see Appendix 1, Q1) was distributed amongst 23 dental graduates attending the residential component of the MClinDent course in London in January 2006. The aims of the Q1 questionnaire were to determine the

reasons for candidates for enrolling on the MClinDent distance-learning programme. It intended to explore and investigate on a small scale the take up of the distance education programme. The purpose was to determine the kind of issues which could be of interest for further investigation, by preparing a better questionnaire. The full results from this questionnaire are given in Appendix 2. The aim was to test the format of the pilot questionnaire, to determine the reasons of the candidates for enrolling onto the MClinDent distance-learning programme. Analysis of the questionnaire provided evidence of the attitudes, perceptions and reasons for the uptake of distance-learning programmes leading to continuing professional development amongst dental graduates.

As is shown in Table 4.1, Chapter 4, a majority of the participants (n=14) in this phase were from the UK; European but non-UK participants (n=7); and the rest (n=2) were non-European. A large number of the UK participants heard about the course from the British Dental Journal (BDJ) whereas the Non-European participants heard about the course from the details provided on the World Wide Web, (See Appendix 1).

The lists of questions used in the pilot survey, i.e. Phase 1 of the study are given below:

Questions 1 to 8 [Q1] (see also Appendix 1)

1. Country of residence [UK/Europe non-UK/non-Europe];
2. How did you hear about this course?
3. Why did you select this distance-learning course rather than the traditional in-house equivalent?
4. If your practice is in the UK are you predominantly private/mixed NHS & private/NHS?

5. Did you compare this course to other in-house courses? [Yes/No]
6. Did you compare this course to other distance-learning courses? [Yes/No]
7. Are you aware of other distance-learning courses in a similar subject? [Yes/No]
8. Would you be interested in attending a clinical training attachment (e.g. 2 days/week for 3 years) near to your home in a local hospital under specialist supervision in order to get on to a specialist list, provided you also had MFDS if in the UK? [Yes/Maybe/No]

Question 9 [How would you rate the following factors while considering applying for this course]

Table 5.1 Factors for Question 9, Pilot Questionnaire – Q1

Easier access if on-line	Very important/important/not relevant/not important
International status of KCL	Very important/important/not relevant/not important
Ability to continue working while studying for post-graduate qualification	Very important/important/not relevant/not important
Reducing disruption to your family while studying	Very important/important/not relevant/not important
Not to have to study in London	Very important/important/not relevant/not important

Out of the seven European non-UK participants there were six "no" responses to question 4. This could be due to the fact that the term NHS was unfamiliar with this group. A significant number of the UK participants (47.8%) compared this course with in-house courses. There were in house MClinDent courses available in the UK and this could be the reason for this. The lower responses to questions 6 and 7 could be due to the fact that there were no similar programmes available elsewhere at the time (see Appendix 2). The majority of the UK participants expressed an interest in attending a clinical training attachment in

order to get on to a specialist list. For both the UK and Non-European group, the factors listed in question 9 were listed as very important or important.

Valuable information was gathered utilizing the pilot questionnaire. However, it did not allow for statistical analysis, and therefore there was a need to develop a questionnaire which would allow us to do so. The design of the next questionnaire (Q2) was based on the first but modified to take into account the findings from the pilot questionnaire. The format of this would allow for the responses to be recorded in a way which would allow statistical analysis for example, a Chi-Square test to be applied.

5.3 Phase 2 – Pilot Questionnaire (Q2) Results

The second phase of the research was to develop Questionnaire 2 [Q2] which was more comprehensive and incorporated quantifiable statistical values. Questionnaire (Q2) (Appendix 3) was distributed at the Maulana Azad Dental School at a seminar on the 27th July 2007. This institute was chosen as it is one of the premier dental colleges in India. The college provides multi-specialty tertiary care of excellence and has nine specialty departments, a research and development centre, and an advanced library. The students came from various parts of the nation and the college being located in New Delhi, the capital of India, provided an ideal setting to pursue our study. There were 23 delegates consisting of post-graduate dental students, dental teachers and academics who were visiting to invigilate the final BDS examinations for the College. The questionnaires, which were then filled in by all the delegates, were collected at the end of the seminar. The response codes were set up and the data collected and recorded. In summary, most of the dental respondents were females in the age group of 25 – 30 years of age. All the delegates kindly accepted to take part in this study and hence filled in the questionnaire. Male

respondents were also in the similar age group. Participation in the survey was voluntary and confidential for all the 23 respondents. Respondents were asked to answer the questions honestly in order to provide individual perceptions of CPD (Continuing Professional Development). They were assured that their responses would be kept in strictest confidence and anonymity.

The survey results were summarized and the results were categorized according to age and gender. Separate comparisons were carried out between gender groups and age categorized. Apart from this, a frequency table with percentages was also presented depicting the valid responses to various categories. Further summary of the statistical results provided a comparative understanding of the dental responses relating to the influence of gender and/or age on the reasons why the Dentists chose to follow CPD. Age and gender categories provided a different analysis of the survey data. Due to the limited number of respondents totaling 23 for this survey, the results were statistically limited regarding generalization to a larger population of dentists or dental organizations seeking to design professional development opportunities for qualified professional dentists. Also the sample group was not representative of all the practising dentists, since all the participants were either involved or had completed some form of post-graduate dental training. However, the results gave a useful indication of certain trends and perceptions and were no doubt influenced by the fact that certain members were themselves providing post-graduate in house dental programmes.

The main results for Q2 are shown in Table 5.2. below. Statistical analysis for Q2 questionnaire data was applied. However the survey was limited as indicated above as the number of respondents involved in the survey consisting of post-graduate dental students, dental teachers, and academics totalled only 23.

Table 5.2 Results from Survey Q2 (n = 23)

39% of the respondents were between 25 to 30 years of age.
57% of the respondents were female.
48% of the respondents had more than 10 years of experience since qualification.
78% of the respondents used high-speed Internet facilities in the course of their work and 100% used the Internet to get information.
39% of the male and female respondents indicated that the worldwide status of the university providing the course was important.
61% of the respondents had had more than 20 study days since their BDS and that same frequency of 61% felt that the actual course topic was important when deciding on a distance-learning course.
Cost was a factor and considered important by 83% of the respondents and 52% had travel issues and felt that it was important to avoid travelling away from home.
The duration of the course for 39% of the respondents was important.
For 39% of the collective 23 respondents, where the course is held was important.
30% of the male and female respondents felt that whether the course providers were private companies or not was not important.
26% of the respondents stated that it was either not relevant or important that the provider of distance courses should be home universities. It was interesting to note that 26% of the female respondents and 22% male felt that it was important that the providers of the course are foreign universities.
35% of female respondents as compared to 13% of males indicated that the course should be recognized by their local dental council.

As the sample size was small and also the sample did not contain practising dentists the results were used as intended, for baseline data to inform the design of the next survey phase of the research. Further analysis was not carried out and the results could not be generalized to a large section of dentists or dental organizations.

The sample size considered for Q3 had to be considerably larger and heterogeneous including private practitioners.

5.4 Phase 2 - Questionnaire (Q3) Results

As explained in Chapter 4, the aims of the Q3 questionnaire were to increase the size of the constituted sample so as to make it more representative of the chosen population for study. As mentioned earlier, the data were collected from three colleges. The two major limitations of the second pilot Q2 were that the survey was firstly limited, as the number of respondents involved in the survey totaled only 23 and the questionnaire was distributed only at Maulana Azad Dental School, New Delhi. Secondly, the group consisted of post-graduate dental students, dental teachers, and academicians and the sample did not consist of any practising dentists who were actually the main target group of the study. In order to overcome these two limitations, the sample size considered for Q3 was considerably larger and heterogeneous including private practitioners. The responses were split into two categories for analysis: Respondents' attitudes to CPD and their preferred means of acquiring it. Reference was made throughout the analysis to the characteristics of respondents and any possible influence of these on their responses. There were also four additional options under Section 2.12 to Questionnaire 2 that were added (see Appendix 5). The questions were regarding the preference of correspondents and the options were:

1) One year online and hands on course leading to a Certificate (60 EU credits);
2) Two year online and hands on course leading to a Diploma (120 EU credits);
3) Three year online and hands on course leading to a Masters (MSc) Degree (180 EU credits);
4) Four year online and hands on course leading to a Masters in Clinical Dentistry Degree (360 EU credits).

Therefore Q3 was mainly intended at improving the sample size for the study and ensuring that the data obtained were more accurate so that the reults could be applied to the general practising dentist population in India. The study also intended to find out the most important factors that encouraged professional dentists to continue CPD through distance education and the barriers that prevented them from taking up of such courses. As per the literature review in Chapter 2, using the Theory of Planned Behaviour [TPB], a comprehensive questionnaire, described in Chapter 4 Section 4.6.2, was prepared for the purpose of collecting data about attitudes, how significant others perceived CPD, and what barriers they perceived towards the uptake of CPD through online courses. Therefore, an important outcome of this study has been a modification of the model developed by Entwistle (2004) to suit online environments in higher education based on the findings of this study.

Questionnaire three (Q3) aimed to collect data pertaining to the above questions. In order to ensure that the sample was free of bias and involved the study subjects, Q3 was distributed among three groups of dentists. The aim was to obtain data that were statistically significant and could be generalized to a large section of dentists or dental organizations. Questionnaire (Q3) (Appendix 5) was handed out to three groups of dentists, of whom 116 responded.

5.4.1 Profile of Respondents

As has been shown in previous studies it was important to find out the characteristics of the respondents to the questionnaire, as these features may have strong determining influences on the responses given. Also, any patterns in the types of questionnaire, recipients selected were identified and their bearing on the results considered.

5.4.1.1 Demographic Profile

The results for the age distribution of the respondents in the three groups are shown in Fig. 5.1; the mean age of respondents was 26 years. Differences in age were apparent between the three respondent groups, as can be seen in Fig. 5.1. The youngest group was group 2 with a mean age of 24 years. Groups 1 and 3 had mean ages of 33 and 27 years respectively. As explained in Chapter 4 and shown in Table 4.1, the composition of the groups was as follows:

i. Group 1: 23 post-graduates and teachers at the Maulana Azad Dental School (Delhi);
ii. Group 2: 70 dental graduates, post-graduates and teachers at Dharwad Dental School (Karnataka);
iii. Group 3: 23 general dental practitioners who attended a post-graduate course at Goa Dental School.

61% of the questionnaire respondents were female [for comparison the average proportion of female dentists in the European Union is 42% (Kravitz & Treasure, 2004)]. This percentage was similar in all three respondent groups.

5.4.1.2 Social Profile

Respondents were, for the most part, early in their careers; almost 70% obtained their first dental qualification less than five years ago. However, this proportion differed greatly from group to group (see Fig. 5.2), with mean time since qualification varying from three years for group 2 to 13 years for group 1.

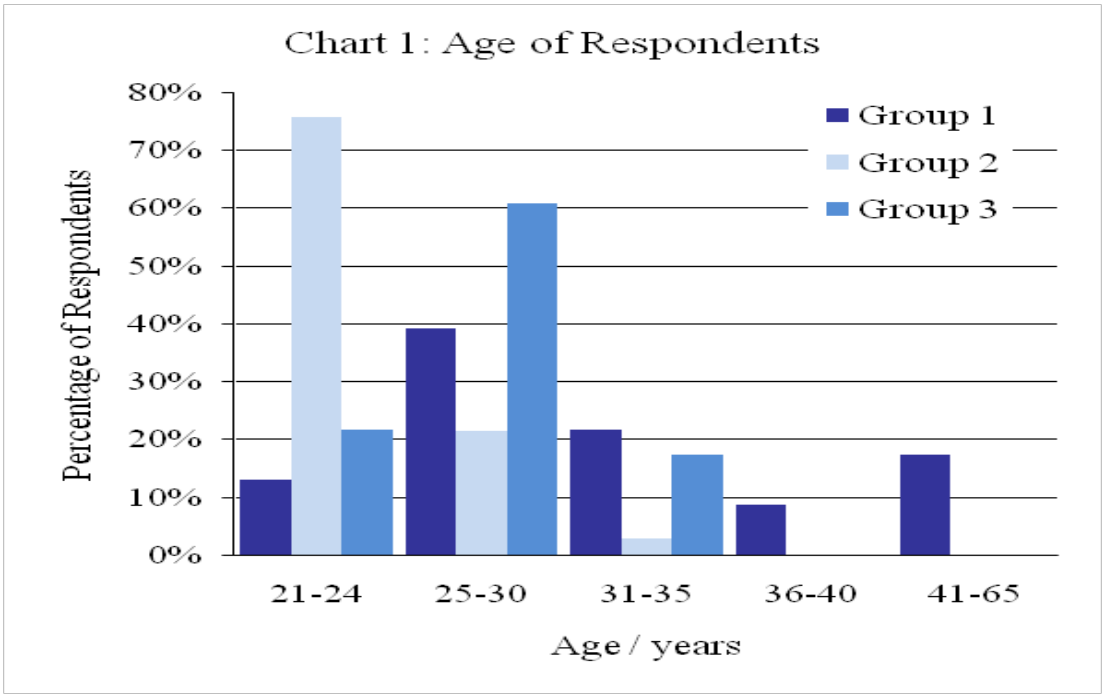

Figure 5.1 Age of respondents for the three participating groups

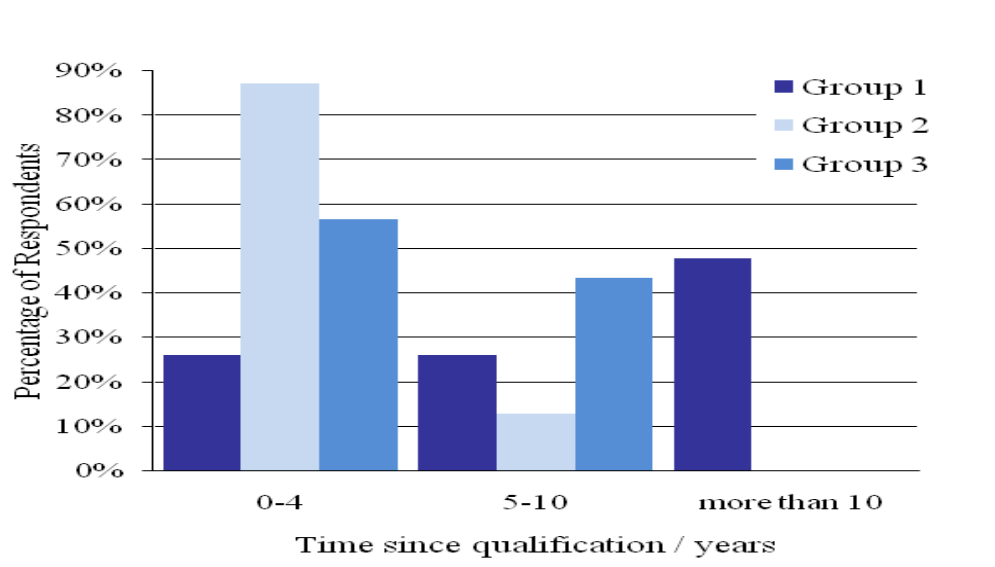

Figure 5.2 Time since gaining main professional qualification

The general information about qualified dentists suggests that they may work in a variety of contexts, including:

i. general practice - providing patients with treatments such as fillings, extractions, fitting dentures and bridges;

ii. Hospitals - carrying out specialized dental work such as restorative dentistry, orthodontics, and oral surgery;

iii. Universities - teaching and researching dentistry, possibly as senior lecturers or professors;

iv. Community Dental Service - caring for people with special needs, young children, and the elderly;

v. Corporate practice - working for a large business providing general dental services to company employees; and

vi. Armed Forces - performing operations in both war and peace times.

A survey conducted in the UK reported that 84% of dentists work in general practice, 7% in Hospitals, 6% in Community Dental Service and 2% in Universities (Kravitz & Treasure, 2009) whereas the majority of the questionnaire respondents (almost 60%) worked in a University context. When our study was compared with the statistics from the UK, here again there were generic differences in areas of work between the different respondent groups. The percentage of dentists in different work places is given in Fig. 5.3. It clearly shows that almost 70% of the respondents from Group 2 were working in Universities. Group 2 respondents were trained by working in Hospitals and Universities and only a few were working in general practice. The majority of Group 3 respondents were working in general practice and hence could be the more representative sample of the focus for this study.

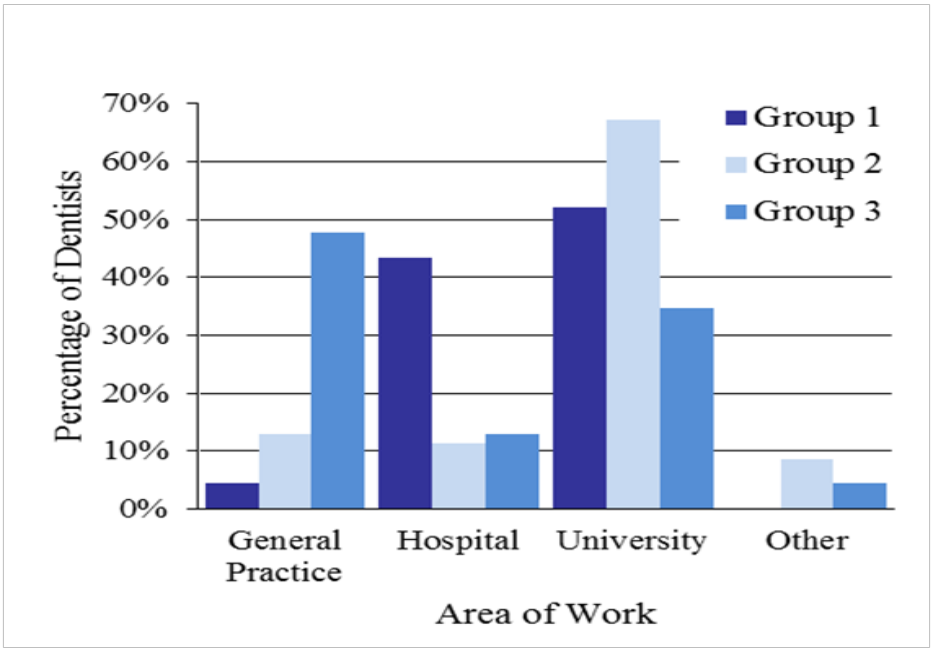

Figure 5.3 Sector in which the subjects worked shown by group

Respondents were well-connected to the Internet, with 85% having access to high speed Internet facilities. A total of 7 respondents who had high speed Internet facilities were working in areas other than general practice, hospitals or universities. Even though the sample size was limited, 93% of all dentists working in these areas had high speed Internet access, still the highest proportion for any group. The segments with the next highest proportions of access were males and those aged between 25 and 30 years, both with 89% of respondents having regular access. Other respondent groups had similar levels of access, except for those working in hospitals, of which only 76% had access, the lowest proportion.

5.4.1.3 Experiences of CPD

A third of all respondents had an official requirement to undertake post-graduate study in order to maintain their registration with their Dental Councils. This varied appreciably with the type of workplace in which the respondents were

employed: only 10% of respondents in general practice but 50% of those working in hospitals, were required to do post-graduate study. This could reflect the fact that the Indian Dental Council (IDC) does not currently have a mandatory requirement for general practitioners to undertake CPD to maintain registration with the council.

When finding out about professional matters the vast majority of respondents (92%) used the Internet.

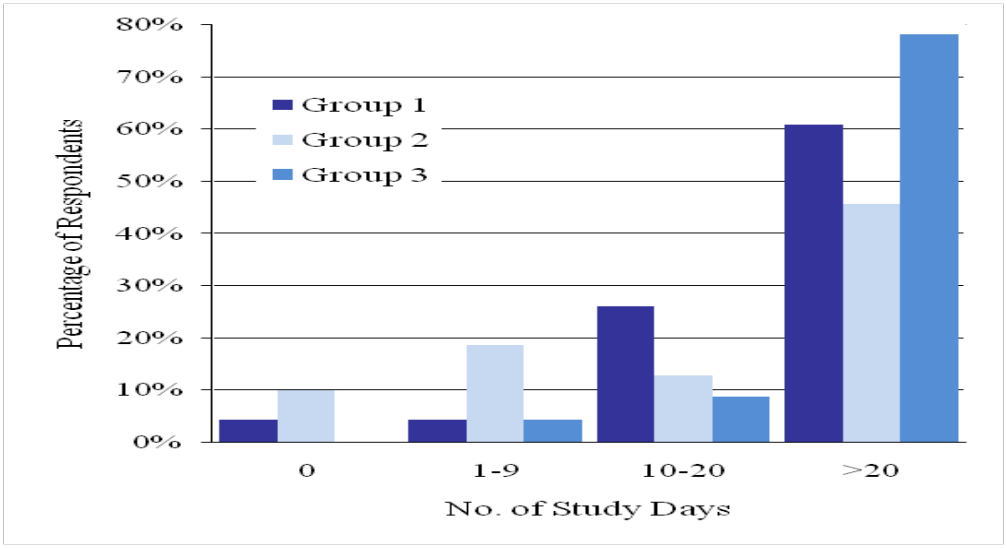

Figure 5.4 Number of study days per year

Fig. 5.4 shows the percentages of respondents and the number of study days, showing that the majority of respondents spent a considerable amount of time on post-graduate study, with over half attending more than 20 study days a year. For comparison, the UK requirement is 10 days over five years.

Only 13% of respondents had ever participated in a course with an online component. Those with access to high-speed Internet facilities were only slightly more likely to have done such a course (15%). The percentage was highest for those respondents who worked in a hospital context, with 33% having participated in an online course.

5.4.1.4 Discussion of Profile of Respondents

When considering the significance of the questionnaire results it is important to bear in mind the way in which the research was carried out, in particular how the questionnaire recipients were selected. In order to compute accurate statistics, responses should be obtained from a sample of the dentist population which is as unbiased as possible. This implies a sample in which all members of the population are equally likely to be included. This can be assessed by comparing the proportions of different categories of dentists included in the sample to the proportions in these categories in the general population. In practice, all samples are biased to some extent, but where the degree of under-representation of any section is small a reasonable approximation can be made to a random sample. In this case, it was quite likely that a bias had been introduced into the sample by the inclusion of more dentists employed in a university context than working in general practice, and younger than older dentists. This would affect the results obtained and any differences observed between respondents employed in different types of workplace, and of different ages, should be given particular attention.

5.5 Analysis of Findings from Questionnaire (Q3)

The results from the Q3 survey of 116 respondents in total comprising three groups as explained above, except for some specific questions which were only answered by one of the groups, as discussed below. In order to remove any biases in the study, before the questionnaire results were analysed, they were checked for validity as summarized below.

If the response rate for any question was below 90%, a cautionary note was added alongside the findings (this was only the case for one question). A possible

reason for a low response is that respondents found the question confusing, which also creates some uncertainty about the responses that were received.

One question was answered only by respondents in Group 1, as it was only included in the questionnaire which they received. Results from this question (a part of question 2.11) were disregarded.

As to question 2.12 " Please indicate with a tick which of the following you would prefer:

- 1 year online and hands on course leading to a Certificate (60 EU credits):
- 2 year online and hands on course leading to a Diploma (120 EU credits):
- 3 year online and hands on course leading to a Masters (MSc) Degree (180 EU credits):
- 4 year online and hands on course leading to a Masters in Clinical Dentistry. Degree (360 EU credits)".

It appeared differently on the questionnaire sent to Group 1 than on that sent to the other two groups. Group 1 was asked only the maximum length of course they would consider, while for Groups 2 and 3, information on the qualification to which each course would lead was also included.

As the response options given to all groups were similar the results were analysed as if all respondents had answered the question sent to Groups 2 and 3. The responses were split into two categories for analysis: Respondents' attitudes to CPD and their preferred means of acquiring it. Reference was made throughout the analysis to the characteristics of respondents and any possible influence of these on their responses.

5.5.1 Attitudes to CPD

From responses given to question 2.9, which asked "do you consider continuing dental education important in your career development", it was seen that a vast majority (96%) of the respondents considered that continuing dental education was important in their career development. Question 2.10, which asked "to indicate responses to the statement relating to post-graduate education" required respondents to rate various statements, according to how strongly they agreed with them. The responses were scored based on the criteria given in Table 5.3. As disagree and strongly disagree are the negative statements, negative scores were given to these categories.

Table 5.3 Weighting system for question 2.10

Rating	Weighting
Strongly agree	4
Agree	2
Uncertain	0
Disagree	-2
Strongly disagree	-4

The results from question 2.10 are shown below in Table 5.4

Table 5.4 Attitudes to CPD from question 2.10

CPD is important	3
CPD is important for career development	2
Post-graduate education enhances your career	3
CPD keeps you up to date with developments	3
Post-graduate qualifications improve your profile among fellow professionals	3
CPD is too time consuming	-1

The results shown in Table 5.4 indicated that the respondents generally had a very positive view of CPD and its benefits for their careers and profile among fellow professionals. A similar pattern emerged in the question about career development: with those respondents working in universities agreeing least strongly that CPD was

important for career development. This was an unexpected result, given that the university employees are most closely involved in providing or receiving CPD. While general practice and hospital workers disagreed that CPD was too time consuming; those employed in universities again stood out, with 37% being uncertain. Thus the surprising result was obtained that while still having a positive view of CPD, dentists working in a university context viewed it less favorably than those in general practice or hospitals.

Question 2.3 inquired "your view of the following factors when having to choose a course" also required statements to be rated, but using a different rating system. The question statements were amended in the results table so that the strength of agreement weighting system (Fig 5.4) could be used: for example, a respondent who answered the question “Your Dental Council considers CPD to be...” with “Important” has been shown as responding to the statement “Your Dental Council considers CPD to be important” with “Agree”.

5.5.2 Preferred means of Acquiring CPD

The questions providing data for this section required respondents to use a variety of rating systems to classify the statements. Question 2.11, "please indicate your view of the following factors when having to choose a course", involved a set of ratings relating to desirability. Here, the question statements were again amended in the results table so that the strength of agreement weighting system and colour code could be used. For questions requiring only a “Yes” or “No” response the percentage of positive responses (answered “Yes”) has been given. The same scheme was followed for Table 5.5 shown below.

Table 5.5 The respondent's most important considerations when choosing CPD: Scale 1 - 4

Source question	Item		Mean Score
2.3	Topic is important when choosing a CPD course		3
2.3	Cost is important when choosing a CPD course		2
2.3	Recognition by your Dental Council is important		3
2.3	It is important that course providers are:	private companies	1
		home universities	1
		foreign universities	1
2.3	The worldwide status of the course provider is important		3
2.3	A practical component is important when choosing a CPD course		3
2.3	Location is important when choosing a CPD course		2
2.3	Avoiding travel is important when choosing a CPD course		0
2.3	Course length is important when choosing a CPD course		2
2.10	Acquiring CPD by reading journals is adequate		0
2.10	CPD via a recognized course is more useful		2
2.10	A DLP needs to be recognized by your Dental Council		2
2.10	CPD delivered via a distance-learning programme (DLP) with a practical component is adequate		1
2.10	Theoretical concepts can be delivered adequately online		1
2.11	A DLP with a practical and an online component is desirable		2
2.11	Recognition by other Dental Councils is desirable		2
2.11	Not travelling away from home for CPD is desirable		0
2.5	Would you consider a course in which the theoretical aspects were delivered directly to your computer via the Internet?		78%
2.6	How far would you be prepared to travel to attend the practical element?	Another city	78%
		Abroad	49%
		No preference	29%
2.8	Would you consider a course if you could complete most from home?		80%

These priorities were again largely uniform across different sections of respondents except that the length of the course was considered a slightly more important aspect by the female respondents than the males.

A follow-on question was asked regarding the type of course which respondents would prefer; the results are shown in Fig. 5.5.

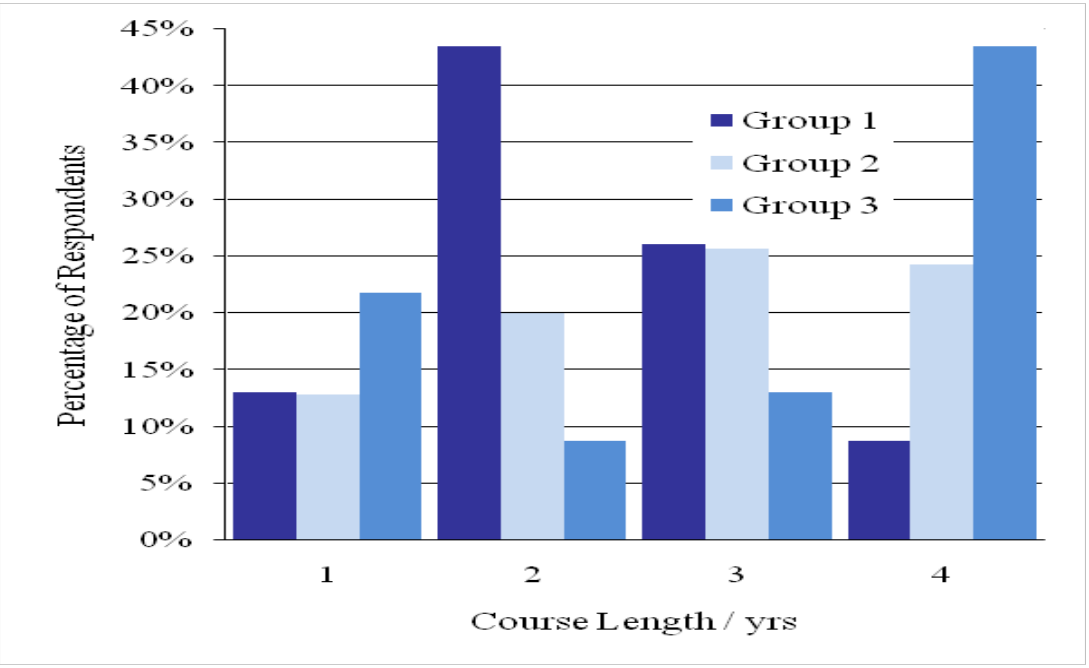

Figure 5.5 Type of Course Preferred

[Note: The response rate to this question was only 85% overall and only 71% for dentists working in hospitals]

The three respondent groups differed with respect to the type of CPD course which they would prefer: Almost half of Group 1 preferred a 2-year course leading to a Diploma; Group 2 were fairly evenly split as to their preferred length; and almost half of Group 3 preferred a 4 year course leading to a Masters in Clinical Dentistry degree.

The type of course preferred by respondents also varied with respondents' age, as shown in Fig. 5.6. The strongest preference was seen in respondents aged over 30 years, of whom over half would choose a two-year course leading to a

Diploma. In general the younger respondents were more willing to consider a longer course, although a two-year course was preferred by all respondent groups to a one-year course.

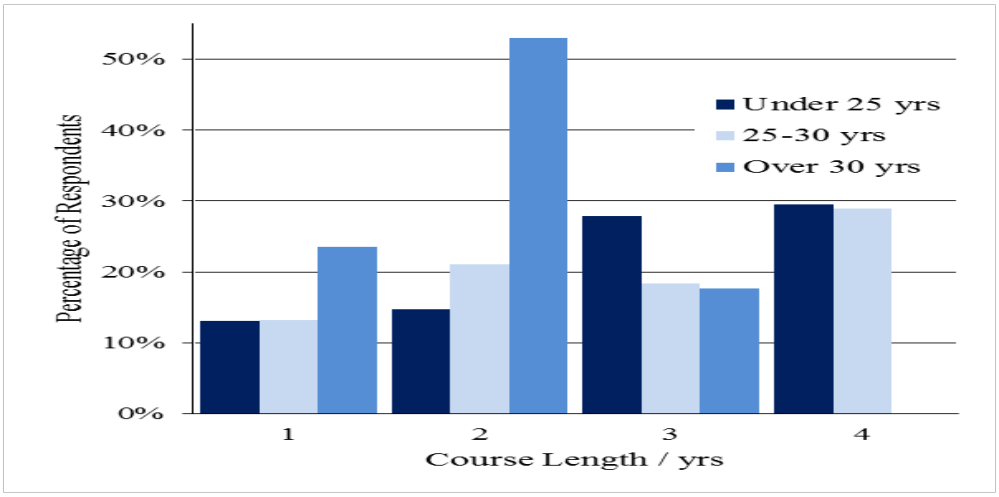

Figure 5.6 Type of Course Preferred by Different Ages

Respondents agreed, with reasonable certainty, that CPD obtained via a distance-learning programme (DLP) with a practical component was adequate. In general, the respondents were in favor of CPD courses which included a practical component. Dentists employed in hospitals agreed most strongly that this type of course was acceptable, but 50% of those in general practice were uncertain. Despite this, 78% of respondents stated that they would consider participating in a course where the theoretical aspects were delivered directly to their computers over the Internet. Differences in responses from certain types of respondent were noted:

- Again, hospital employees were most likely to be willing to consider participating in a course with an online component (90%), followed by dentists in general practice (85%).
- 78% of the university–based dentists would consider such a course, but only 43% of the dentists, employed in areas other than those already mentioned.

This was a significantly different proportion than the 85% for dentists working in the main areas of employment, but as the sample size is very small (only seven respondents) a wide confidence interval (37%) is applicable.

- The older respondents were slightly more open-minded about online courses than the younger: 88% of those aged over 30 years would consider participating in one as opposed to 74% of those aged 21-24 years.
- Understandably, respondents without access to high-speed Internet facilities were less likely to consider a course with an online component: 67% as opposed to 82% of those with a fast connection.

In general, respondents considered that the location of the CPD course was important, but they were split as to whether travel was an advantage or to be avoided as elaborated below:

1. Respondents aged over 30 years were more likely to prefer to avoid travelling;
2. Female respondents were more likely than males to want to avoid travelling;
3. A noteworthy minority (27 respondents) considered travel as a desirable element of attending a CPD course. 63% of these respondents were aged between 21-24 years of age and 70% of these respondents were female.

Most respondents would be prepared to travel to attend the practical component of a DLP course. 78% would be willing to go to another city, 49% abroad, and 29% did not have any preference. The differences were apparent in the responses received from dentists who worked in different contexts i.e.:

1. Those in general practice were the most willing to travel to another city (95%), but unwilling to travel abroad (only 33%);

2. Hospital employees were the most willing to travel abroad (62%), followed by those in universities (52%). The respondents were uncertain in general whether acquiring CPD by reading journals was adequate. Older respondents were more likely to disagree with this (53% of those aged over 30 years), but none of the groups seemed to express a consistent view.
3. The respondents were in general not too concerned whether CPD courses were provided by private companies, home universities or foreign universities, as long as they had recognition from The Dental Council and were of high status.

5.5.3. Statistical Significance

Statistical significance tests were applied to measure the likelihood that the results obtained from the tested sample were representative of the whole population, which in this case would relate to all professional dentists in India without already having a post-graduate qualification. In general the larger the sample the greater the detail level at which significant characteristics could be detected.

5.5.4 Statistical Comparisons

Significance tests were carried out to test the following hypotheses:

a) The respondents were willing to consider an online course for their CPD; and
b) The respondents were willing to travel some distance from their home in order to attend a practical component.

These aspects were chosen in particular because they seemed the most informative on the questionnaires' focus of whether the respondents would consider participating in an online DLP course with a practical component.

1. Online courses

The results from questions 2.5 (concerning courses with an online component delivering theoretical aspects via the Internet) and 2.8 (concerning courses where the majority can be completed online from home) were very similar. This was useful in the analysis because it allows the answers to be cross-checked.

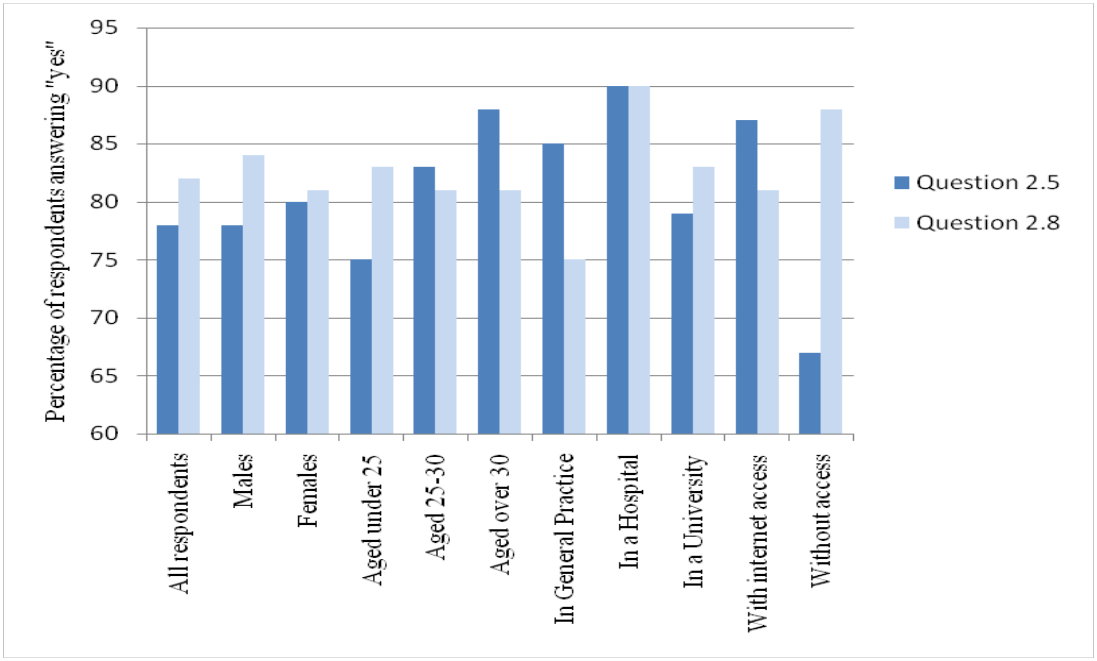

Figure 5.7 Comparison of responses for questions 2.5 and 2.8

For all respondent categories except one (shown in Fig. 5.7), the percentage answering “yes” to questions 2.5 and 2.8 differed by 10% or less. The exception was for those respondents without access to a high-speed Internet connection, of whom 20% more answered “yes” to question 2.8 than to 2.5. The reason for this is possibly that question 2.5 implies the need to download material while question 2.8 suggests that this may not be necessary. The speed of downloading material from the Internet would be much lower without access to a high-speed Internet connection. The percentages of affirmative responses to questions 2.5 and 2.8 have been averaged for

all respondent categories in order to calculate the confidence intervals in order to show how reliable the results are. These intervals are shown in Tables 5.6 and Fig. 5.10.

Between 78% and 90% of respondents in all sections of the sample, answered that they would consider participating in an online course. For most of the segments the confidence interval was between 70% and 95% of the general dentist population.

Table 5.6 Confidence intervals at 95% level for willingness to consider an online course

Sample			**Confidence Interval**	
Section	**Number of respondents**	**Percentage answering "yes"**	**Lower bound**	**Upper bound**
All respondents	116	80	73	87
Males	45	81	70	93
Females	71	81	71	90
Aged under 25	60	79	69	89
Aged 25-30	37	82	70	94
Aged over 30	17	85	68	100
In General Practice	20	80	63	98
In a Hospital	20	90	77	100
In a University	66	81	72	91
With Internet access	98	84	77	91
Without access	16	78	57	98

Wider confidence intervals were obtained for respondents:

- Aged over 30 years;

- Working in general practice;
- Working in hospitals; or
- Without access to high speed Internet access

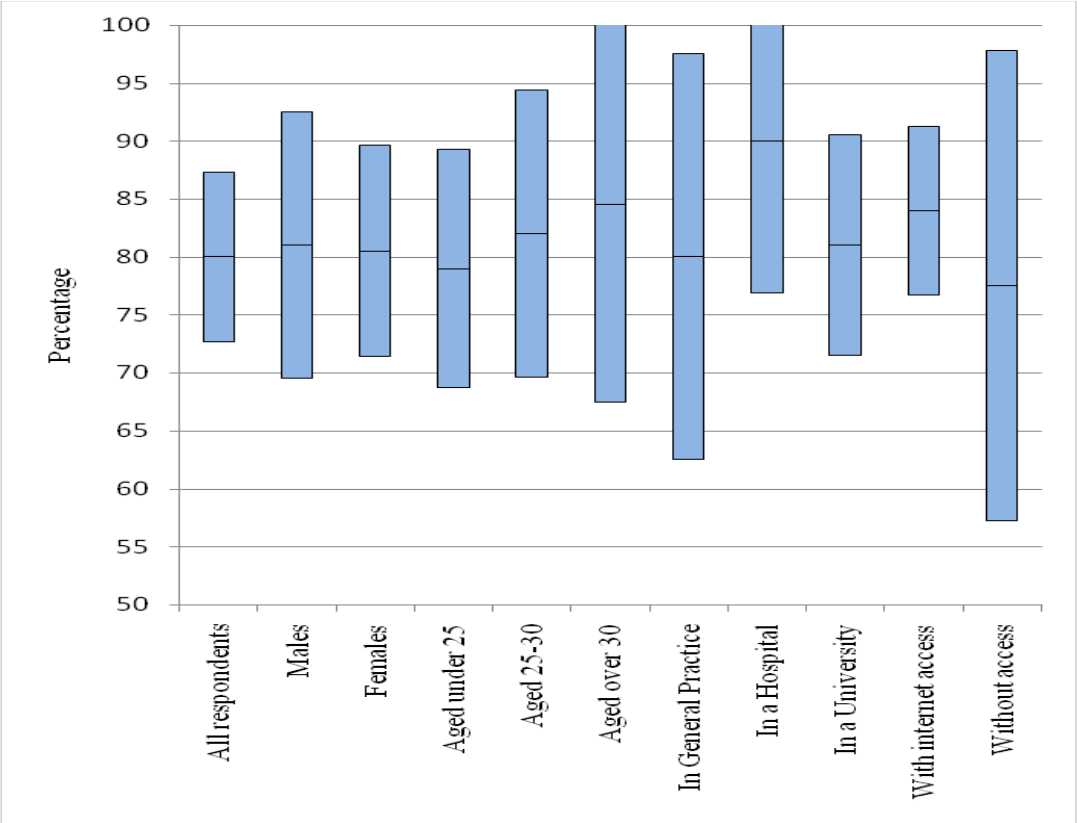

Figure 5.8 Confidence Intervals for willingness to consider an online course

From these results it seems probable that dentists working in hospitals are more likely to consider participating in an online course and that those without high speed Internet access are less so, but the differences are outweighed by the uncertainty due to the sample size. Therefore no firm conclusions can be drawn from the present data about differences between the respondent sections in willingness to participate in an online course.

2. Travel distances

The data analysed in this section was drawn from the responses to question 2.7 (willingness to travel to another city or abroad) with some comparisons made with the responses to part of question 2.3 (the importance of avoiding travel in selecting a CPD course) and question 2.6 willingness to travel). Question 2.7 was chosen as it provides the most quantitative information on the amount of travel respondents would be willing to undertake (travel to another city).

Table 5.7 Confidence interval at 95% for willingness to travel to another city

Sample			**Confidence Interval**	
Section	**Number of respondents**	**Percentage answering "yes"**	**Lower bound**	**Upper bound**
All respondents	114	79	73	85
Males	43	72	61	84
Females	71	83	76	90
Aged under 25	60	75	66	84
Aged 25-30	37	78	68	89
Aged over 30	17	94	81	100
In General Practice	21	95	86	100
In a Hospital	20	75	59	91
In a University	66	74	65	83

The proportions of respondents willing to travel to another city along with its 95% confidence interval are shown in Fig 5.9 and Table 5.7. From these it is clear that a large proportion of respondents (above 70%), both males and females, were willing to travel. However, although more female respondents (83%) were willing to

travel to another city than male respondents (72%), using the Z-test the difference between males and females were not statistically significant ($p>0.5$). A similar result, using the same test was obtained between different age groups with the 'over 30 year' respondents (94%) showed more willingness than the other age group to travel to another city for the practical CPD.

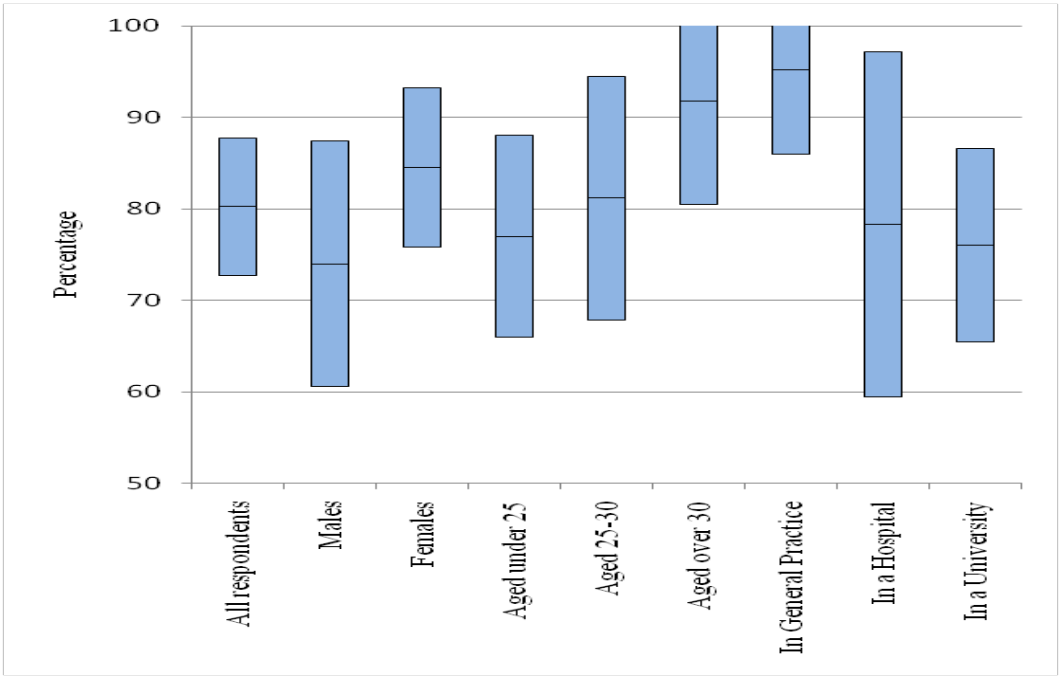

Figure 5.9 Confidence Intervals for willingness to travel to another city

But, regarding the work-place, the proportion of respondents willing to travel in the general practice group is significantly larger using a Z-test ($p<0.05$) than the respondents willing to travel in the university group.

Fig. 5.10 below shows a comparison of the results from questions 2.3 and 2.6. For most sections of the sample a very similar percentage of respondents were "willing to travel" as rated avoiding travel as not "very important". For most respondent sections, the percentage willing to travel to another city was lower than these, but not as low as for respondents who rated that avoiding travel was neither

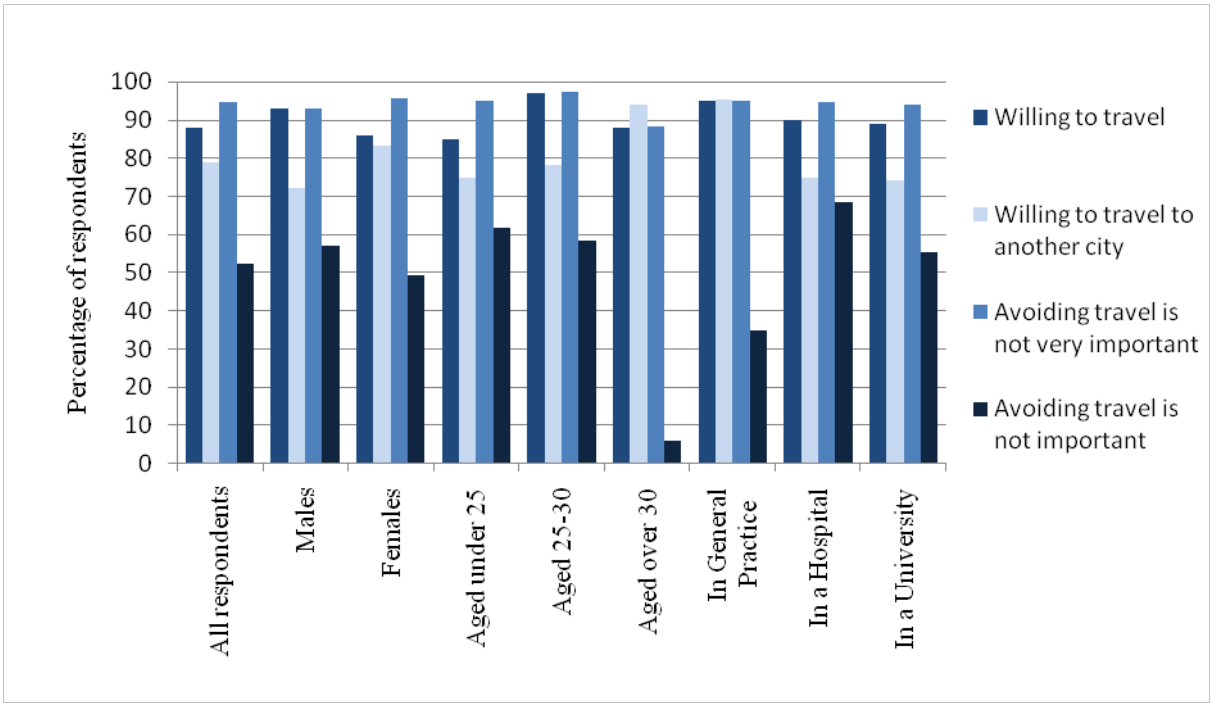

Figure 5.10 Comparison of responses to questions 2.3, 2.6 and 2.7

"important" nor "very important". Therefore, it can be said that travel to another city is generally unacceptable to those who consider avoiding travel "very important",but not to all of those who consider avoiding travel "important". It is possible, that respondents, in considering these questions, had in mind different scenarios for the effort, time and expense involved in travelling to another city; due to the size of India there must be many cities both near and far from respondents' homes.

Travel abroad

Table 5.8 and Fig. 5.11 shows the confidence interval results for willingness to travel abroad. Fig. 5.11 shows that for most of the respondent segments, slightly over half were willing to travel abroad. Two surprising results were obtained, however, female respondents were more likely to be willing to travel abroad than male respondents; and respondents working in general practice were less likely to be willing to travel abroad. Signficantly (Z-Test, $p<0.05$) a larger proportion of females

were willing to travel abroad when compared to the male counterparts. While it is probable that there is a difference in willingness to travel abroad between dentists working in general practice and those in other areas, this was not statistically significant ($p>0.05$).

Table 5.8 Confidence intervals at 95% level for willingness to travel abroad

Sample			Confidence Interval	
Section	**Number of respondents**	**Percentage answering "yes"**	**Lower bound**	**Upper bound**
All respondents	114	50	41	59
Males	43	51	36	66
Females	71	83	74	92
Aged under 25	60	47	34	59
Aged 25-30	37	51	35	67
Aged over 30	17	59	36	82
In General Practice	21	33	13	53
In a Hospital	20	65	44	86
In a University	66	53	41	65

In conclusion, from the results shown in Figure 5.11 and Table 5.8, a larger proportion of females were willing to travel abroad when compared to male counterparts. While it is probable that there is a difference in willingness to travel abroad between dentists working in general practice and those in other areas, this difference was small.

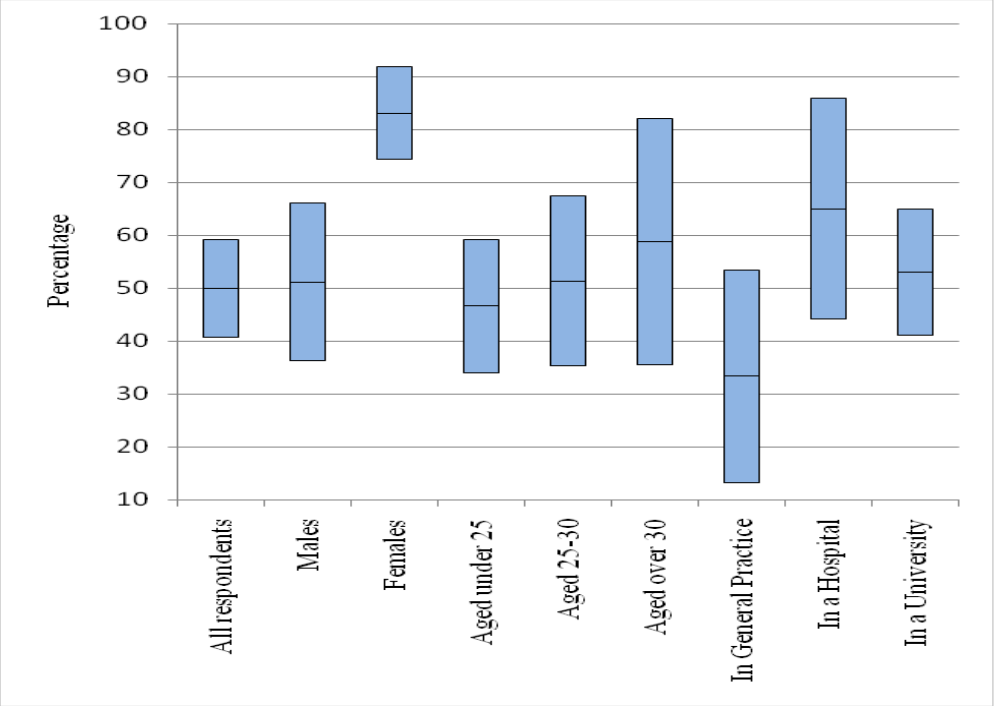

Figure 5.11 Confidence Intervals for willingness to travel abroad

The number of respondents willing to travel abroad to attend the practical component of a CPD course (question 2.7) was generally well matched with the number stating that avoiding travel was not important (question 2.3) or not desirable (question 2.11). Fig. 5.12 shows a comparison of the responses to the three questions. For the female respondents, the percentage stating that avoiding travel was not important and not desirable were similar and in line with those seen for the male respondents; the difference was evident only in their willingness to travel abroad. This result seems peculiar, but may be explained by the fact that question 2.7 refers to travel to attend only the practical component of a CPD course while questions 2.3 and 2.11 could be interpreted as referring to travel to attend the entire course. Hence, it may be an extended period away from home which is less appealing to female respondents, although they find the travel itself attractive.

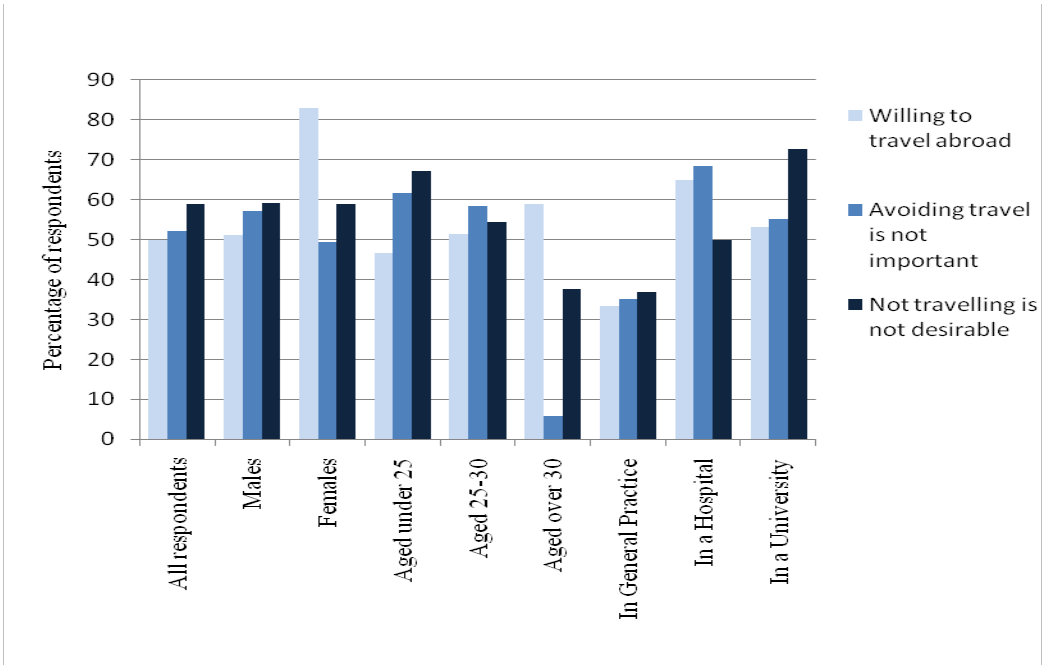

Figure 5.12 Comparison of responses to questions 2.3, 2.7 and 2.11

For respondents working in general practice the responses to all three questions were well matched and remained lower than for other respondent categories. This corroborates the theory that those employed in general practice are less willing to travel abroad than those in other areas. For respondents aged over 30 years of age, a curious situation was observed in which the responses to each of the questions were very different. The reasons for this are unclear, but the small sample size (only 17 respondents) is likely to be partly responsible.

5.5.5 Relationships between different variables

The relationships between different variables were assessed using correlation coefficients. Correlation coefficients were used to measure how well the results' patterns matched, and whether two factors were regarded similarly by the respondents. Coefficients were calculated for ranked categories (such as the ratings used in questions 2.3 and 2.10) using Spearman's Rank Correlation Coefficient which can range in value from –1 (a perfect negative relationship) to +1 (a perfect

positive relationship), with a value of 0 indicating no linear relationship. The statistical significance of a correlation depended chiefly upon its strength and the number of data-points (respondents). This means that with samples of sufficient size, weak correlations may be found to be statistically significant, but still of little practical use. A correlation indicates that the two factors were regarded similarly by the respondents; this may be due to a cause-and-effect relationship, but is not necessarily so.

Correlations were calculated for factors affecting respondents' choice of CPD course (data from question 2.3 which asked "please indicate your view of the factors when having to choose a course); and the respondents' opinions of CPD (data from question 2.10 which asked "please indicate your response to the following statements relating to post-graduate education"

5.5.5.1. Factors affecting choice of course

Table 5.9 below shows the correlation coefficients between factors which may affect respondents' choice of CPD course. The cells are coloured according to the strength of the correlation. The majority were weak, with coefficients close to zero, but there were three strong positive correlations with coefficients above 0.5 and a further 30 fairly strong correlations with coefficients above 0.2. 22 correlations were significant at a 99% level and a further 12 at a 95% level.

The strongest correlations (all significant at a 99% level) were all related to the type of organization providing the CPD course: whether it was a private institution, a home university or a foreign university. The correlation between these factors indicates that, generally, the same respondents considered them important. This seems surprising as these options are mutually exclusive; it suggests that

respondents who considered the course provider to be of importance would be equally content with a course provided by a private institution, a home university or a foreign university.

Correlations between 0.2 and 0.5 (significant at a 95% level or higher) were found between the following factors, in descending order of correlation strength:

a. Inclusion of a practical component and the status of the course provider;

Reasonably higher and significant correlations were found between these two measures indicating that the respondents who thought that the inclusion of a practical component to be important also felt that the status of the course provided was important.

b. Course length, provider and location.

These aspects, i.e. the more physical characteristics of a course, were considered important by a similar group of respondents. It could be expected that the importance of avoiding travel would be correlated with the importance of the course location, but the correlation found here was in fact quite weak (coefficient of 0.111).

i. Course provider, provider status and Dental Council recognition:

These aspects all relate to the probable recognition given to the course: i.e. Dental Council, fellows' and patients' opinions of CPD and the course provider status.

Respondents giving importance to the opinion of one of these groups generally also considered the opinions of the other groups important.

ii. Length and fellows' opinion of the course.

This correlation may indicate that respondents believed that their fellow professionals would regard a longer CPD course more highly.

iii. Cost and length of course and provision by a home university:

Table 5.9 Correlation coefficients between factors which may affect respondents' choice of CPD course

Factor:	Cost	Avoiding Travel	Length	Recognition	Location	Private Provider	Home Uni. Provider	Foreign Uni. Provider	Provider Status	Practical component	Dental Council Opinion	Fellows' Opinion	Patients' Opinion
Topic	**0.218**	-0.166	-0.078	0.130	-0.078	-0.128	0.041	-0.033	**0.196**	**0.226**	0.123	0.032	-0.007
Cost		-0.080	**0.299**	0.183	0.173	0.138	**0.256**	0.185	0.185	0.157	0.125	**0.212**	0.110
Avoiding			0.044	-0.050	0.111	0.120	0.012	0.107	0.019	-0.058	0.094	0.125	0.123
Length				0.151	**0.242**	**0.343**	**0.309**	**0.241**	**0.202**	0.092	0.082	**0.303**	**0.214**
Recognition					**0.231**	0.151	**0.262**	0.064	**0.288**	0.132	0.104	0.111	0.137
Location						**0.310**	**0.254**	**0.290**	**0.233**	-0.006	0.036	0.055	0.030
Private							**0.624**	**0.530**	**0.262**	0.099	-0.069	0.113	0.115
Home Uni.								**0.621**	**0.363**	0.123	0.066	0.016	0.167
Foreign Uni.									**0.284**	0.111	-0.077	0.100	**0.244**
Provider status										**0.401**	**0.233**	**0.264**	**0.220**
Practical											0.177	0.178	0.130
Dental												**0.339**	**0.273**

Key:

Perfect positive correlation	1.000
No correlation	0.000
Perfect negative correlation	-1.000

Respondents who felt that the cost was an important factor often considered the course length and the provider being a home university also to be important. It could be thought that this related to the cost saved by avoiding travel to a foreign university but, in fact, the correlation between the importance of cost and of avoiding travel was almost zero (r=-0.08).

The average score for avoiding travel was actually 0. This could mean that either a) no-one was very concerned about this, or b) the respondents who were very positive were balanced by the same numbers who were very negative. Since avoiding travel has no statistically significant correlation with any other variable, it is likely that a) is the case.

iv Provision by a foreign university and patients' opinion:

The Spearman's rank correlation between these two variables was 0.244 so the respondents felt their patients would regard a professional qualification from a foreign university as valuable.

c. Course topic, cost and the inclusion of a practical component.

The concern over the costs was not likely to make respondents more or less likely to be concerned about the practical element of the topic.

5.5.5.2. Opinions of CPD

Table 5.10 shows the correlation coefficients between various aspects of the respondents' opinions of CPD. There were three strong positive correlations with coefficients greater than 0.5, and 22 correlations with coefficients between 0.2 and 0.5, one of which was negative. 18 correlations were significant at a 99% level, and a further eight at a 95% level. The strongest correlations (all significant at a 99% level) were found between the following variables:

The importance of CPD, its importance for career progression and its value for keeping up to date:

This correlation indicated that in general those respondents who considered CPD important also recognized its value for career progression and for keeping up to date with recent developments in dentistry.

The opinion that post-graduate qualifications enhance one's career and that they improve one's profile among fellow professionals:

This suggests that respondents recognising CPD's potential for improving their careers also felt that it enhanced their image within the dentistry community. It is plausible that these two aspects were linked, one leading to the other; this would account for the correlation in respondents' attitudes. Correlations with coefficients between 0.2 and 0.5 (significant at a 95% level or higher) were identified between the following opinions:

CPD can be obtained adequately from a DLP course with a practical component, and that the theoretical elements can be adequately delivered online:

This correlation suggests that when the respondents would find a DLP course with an acceptable practical component, they would generally also be content for the theoretical elements to be delivered online.

Theoretical elements can be adequately delivered online and CPD keeps one up to date:

In considering this correlation it is useful to refer also to the responses to question 1.6 (use of the Internet to obtain information regarding professional matters). Those respondents already using the Internet to find out about professional issues (92%) were more likely to recognize the value of CPD for keeping up to date. They were also more likely to consider that theoretical elements of a CPD course could be adequately delivered online as this group was more familiar with the use of the Internet and had a greater awareness of its capabilities.

Table 5.10 Correlation coefficients between various aspects of respondents' opions of the CPD factors.

correlations for question 2.10

CPD is:	Important for career	For keeping up to date	Too time consuming	Adequate from journals	More useful if recognized	Adequate from DLP & prac.	Adequate online for theory	DLP needs Council recognition	Qualifications enhance career	Qualifications improve profile
Important	**0.537**	**0.407**	-0.075	-0.165	**0.216**	0.182	0.171	0.087	**0.403**	**0.257**
Important for career		**0.502**	-0.041	-0.128	**0.356**	0.165	**0.252**	0.114	**0.269**	**0.245**
For keeping up to date			-0.031	-0.159	**0.235**	0.142	**0.428**	**0.236**	**0.347**	**0.258**
Too time consuming				0.088	0.000	0.125	**0.252**	0.046	-0.098	-0.028
Adequate from journals					-0.141	0.082	-0.065	**-0.201**	-0.030	0.110
More useful if recognised						**0.226**	0.114	**0.249**	**0.245**	0.049
Adequate from DLP & prac.							**0.444**	**0.218**	0.107	0.138
Adequate online for theory								**0.232**	**0.197**	0.112
DLP needs Council recognition									**0.251**	0.062
Qualifications enhance career										**0.507**

Key:

Perfect positive correlation	1.000
No correlation	0.000
Perfect negative correlation	-1.000

Their confidence was supportive of the feasibility of an online delivery system for the theoretical elements of a DLP course.

CPD is important for career development and is more useful with Dental Council recognition:

It is of interest here that the importance of CPD specifically for career progression was correlated with the preference for Dental Council recognition, more so than the importance of CPD in and of itself. This seems appropriate if the Dental Council were to act as an accepted approver of dental qualifications which employers may be assessing, or even had a role to play itself in the recruitment of dentists to certain positions.

CPD is too time-consuming and theoretical elements can be adequately delivered online:

This correlation suggests that respondents for whom time is at a premium were more inclined to consider that the theoretical elements of a DLP course could be adequately delivered online, probably as they felt that this method would result in time saving. The only significant positive correlation was found between CPD being 'too time consuming' and 'adequate online theory' (r=0.252) suggesting that respondents for whom time is at a premium were more inclined to consider that the theoretical elements of a DLP course could be adequately delivered online, probably as they felt that this method would result in time saving.

CPD can be adequately obtained from reading journals and a DLP course does not need Dental Council recognition:

The flexibility which learning theoretical aspects of CPD through online courses often provides supports the previous time-saving evidence from the literature (See Chapter 2 Section 2.4.3). Several studies (e.g. see) have shown that theoretical aspects of CPD for some professionals could also be adequately obtained from

reading journals. Both modes of providing theoretical CPD elements enable very busy professionals to enhance their knowledge in their own time.

5.6 Conclusions for Questionnaire Survey - Q3

The view of CPD was in general very positive, with respondents recognising its benefits for their careers, profiles among their fellow professionals and for keeping up to date. Most respondents were early in their careers and seemed committed to CPD, with over half spending more than 20 days a year on study. CPD was considered especially important by those working in general practice.

5.6.1 Breakdown of Respondents' Preferences

Respondents' most important considerations when choosing a CPD course were:

a) Topic;

b) Recognition by their Dental Council;

c) The worldwide status of the course provider;

d) The inclusion of a practical component.

The course topic was naturally seen as an important factor because it determined whether the course would be relevant to a particular dentist; however, this aspect was not further explored in this questionnaire. Respondents stated that generally they would be equally content with the course provided by a private institution, a home university or a foreign university, as long as it had Dental Council recognition and was of a high status. This was viewed as enhancing the image of the course in the eyes of not only their Dental Councils, but also of their fellows and patients. Recognition by the accrediting council was considered to be very important in guaranteeing the quality of the professional education offered.

Respondents believed that a practical component was an important part of a CPD course and in general were wary of acquiring CPD by reading journals alone.

In general, respondents agreed that CPD could be obtained adequately via a Distance Education Programme with a practical component. Respondents who found such a course acceptable were usually also content for the theoretical elements to be delivered online. Despite the limited experience of online courses (only 13% of respondents had participated in one) around 80% said they would consider undertaking one. Respondents were well IT connected, with 85% having access to high-speed Internet facilities. The largest proportion having access was found among those working in areas other than general practice, hospitals or universities; and the lowest proportion was found among those working in hospitals. Despite this, the highest percentage having already participated in an online course (33%) was found among those working in hospitals, who were also most likely to be officially required to undertake post-graduate education. Respondents without high-speed Internet access were no less enthusiastic about online courses, but appeared to be discouraged by the need to download material.

The literature review in Chapter 2 also depicted the importance of Internet access while considering distance education programmes. Crooks (1983) had suggested that the course designers must take into account the students' resources while designing online distance education courses. The PANdora project also showed how the selection of technology for a delivery system becomes an important factor in sustaining the learners' interest and motivation in a distance education system.

Further aspects of importance were stated to be:

a) Cost;

b) Recognition by other Dental Councils;

c) Location;

d) Course length.

The course cost was naturally seen as an important factor as it determines whether it would be possible or sensible for a particular dentist to attend, but this aspect was not further explored in this questionnaire. In general, the respondents considered that the location of a CPD course was important and especially females, who were over 30 years, felt it was desirable to avoid travel. However, the majority would be prepared to travel to attend the practical component of a DLP course; half would be willing to go abroad and almost 80% to another city. A minority of the respondents considered travel a desirable element of attending a CPD course; most of these were young and/or female. Female respondents on the whole, were significantly more likely to be willing to travel abroad than males; it appeared that female respondents might find travel itself attractive but extended periods away from home was less appealing.

Respondents working in general practice were significantly more willing to travel to another city than those working in universities, though it is possible that respondents, in considering these questions, had in mind different cities. The length of course preferred by respondents varied with the age of the respondent. The strongest preference was seen in those aged over 30, of whom, over half would choose a two year course leading to a Diploma. In general, the younger respondents were more willing to consider a longer course.

5.6.2. Respondents' Ideal CPD Course

In order to be as attractive as possible to potential participants, the questionnaire results indicated that a CPD course should have the following characteristics:

1. A relevant topic;
2. A respected provider with Dental Council recognition;
3. A practical component;
4. Theoretical elements able to be completed online;
5. Not requiring material to be downloaded;
6. Not requiring an extended period away from home;
7. A length of two years (leading to a Diploma).

As a result of the analysis of Q3, amendments (see Appendix 5) were made for the development of the final questionnaire (Q4) for distribution. Based on the above findings, Q4, which was developed from the analysis of Q3, was distributed to 201 general dentists practising in India. The distribution of the questionnaire was via a randomized stratified sampling method. The results of the final Phase of the research Q4 are presented in the following chapter.

CHAPTER 6: RESULTS OF PHASE 3 OF THE STUDY

Based on the literature survey in Chapter 2 and the results from the Q3 survey presented in the previous chapter, it was possible to arrive at the conclusion that the background characteristics of learners such as gender and age does affect the uptake of an online course. Technological factors also acted as another major barrier for the uptake of CPD. Ability and confidence with online learning technology, learner's attitude to CPD, their preference for specific subjects, teaching styles, teaching-learning environments which facilitated interaction among learners were found to be other factors which affected their learning in online environments. Profiles of the respondents were assessed as two components namely demographic profile and social profile in Q4.

6.1 Demographic Profile

As a step towards obtaining more accurate data during the Q4 phase, an attempt was made to find out the demographic profile of the candidates willing to consider a distance education programme in dentistry. The details about the demographic variables and the response along with percentage for various measures are summarized below in Table 6.1.

Table 6.1 Demographic variables and the response along with percentage for various measures

Variables	**N (%)**
Age	
<25 yrs	51 (25.4)
25-30	77 (38.3)
31-35	27 (13.4)
36-40	21 (10.4)
>40	25 (12.4)
Time in Years	
< 5	112 (55.7)
5-10	34 (16.9)
>10	55 (27.4)

Table 6.1. continued	
Variable	**N(%)**
Gender	
Male	90 (44.8)
Female	111 (55.2)
Workplace	
general practice	198 (98.5)
Others	3 (1.5)
Internet speed	
High speed	182 (90.5)
No	19 (9.5)
Internet use	
Yes	183 (91.0)
No	18 (9.0)
Access to means of travel	
An International airport	41 (20.4)
National airport	32 (15.9)
Mainline railway station	106 (52.7)
National highway	22 (10.9)
Online course	
Yes	147 (73.1)
No	54 (26.9)
Unwillingness to consider an online course	
Disagree	15 (27.8)
Strongly disagree	26 (48.1)
Agree	5 (9.3)
Strongly agree	7 (13.0)
Can't say	1 (1.9)
No confidence	
Disagree	9 (16.7)
Strongly disagree	11 (20.4)
Agree	15 (27.8)
Strongly agree	18 (33.3)
Can't say	1 (1.9)
Internet speed slow	
Disagree	3 (5.6)
Strongly disagree	15 (27.8)
Agree	13 (24.1)
Strongly agree	20 (37.0)
Can't say	3 (1.9)

Table 6.1. continued	
Variable	**N(%)**
Cannot sit	
Disagree	4 (7.4)
Strongly disagree	5 (9.3)
Agree	7 (13.0)
Strongly agree	26 (48.1)
Can't say	12 (22.2)

*Missing data were excluded from the percentage calculation.

6.1.1 Age Group

With regard to age, of the total 201 respondents, it was found that 64% of the respondents were below 30 years of age. Most respondents were in their early careers; with 38% in the age group 25-30 years and 25% in the age group less than 25 years. With respect to time that has elapsed since obtaining graduation, 55.7% of the respondents had completed their graduation less than 5 years ago. In relation to gender of the dentists who had indicated that they would consider a distance education course, 44.8% of the respondents were males and 55.2% were females.

6.2 Social Profile

Social profiling aimed to collect data regarding work-place, access to the Internet, access to travel, willingness or unwillingness to consider online courses, and preparedness to consider travel to attend practical component of courses.

6.2.1 Workplace

As part of the study it was important to know the current employment of the candidates. This would enable us to understand in depth about the subjects who were willing to consider a distance education programme. However, from our final survey the results suggested that 98.5% of the respondents were from general practice. The data were therefore not representative of all types of employment. It did not include

the sample from those employed in university, college, institutions, or military services.

6.2.2 Internet Access and Use

Results from the survey showed that 90.5% of the respondents had access to high speed Internet and that 91% of the population used the Internet to access information.

6.2.3 Access to means of travel

Regarding access to the means of travel, 52.7 % of the respondents had a mainline railway station and 36.3% had either a national or international airport nearby to their place of residence.

6.2.4 Subjects willing to consider an online course

About 73.1% of the respondents said 'YES' when asked whether they would consider an online course and 26.9% of the respondents said 'NO'.

6.2.5 Reasons for unwillingness to consider a course

With respect to the unwillingness to consider an online course, 75.9 % of the respondents either disagreed or strongly disagreed that they were unwilling to consider online course because of unfamiliarity with the Internet. This means that the large majority was willing to consider online courses although there was a range of barriers which they reported.

1. About 33.3% of the respondents who replied ‘no’ to willingness to attend a course agreed that they had no confidence to enrol for an online course.
2. About 37% of the respondents who replied ‘no’ agreed that the Internet being too slow was the reason for not taking an online course.

3. Also 48.1% of the respondents who replied ‘no’ said that 'they cannot sit for long hours' as being the reason for not taking an online course.

The results above were analysed more fully to understand the barriers to the take up of distance education programmes.

6.2.6 Preparedness to travel to attend a practical component of a course

In a distance education programme involving a component teaching advanced skills, it was very important to assess whether candidates were willing to travel to attend practical components of the course. The results of how many of the respondents were prepared to travel to attend the practical component of the course are shown in Fig. 6.1

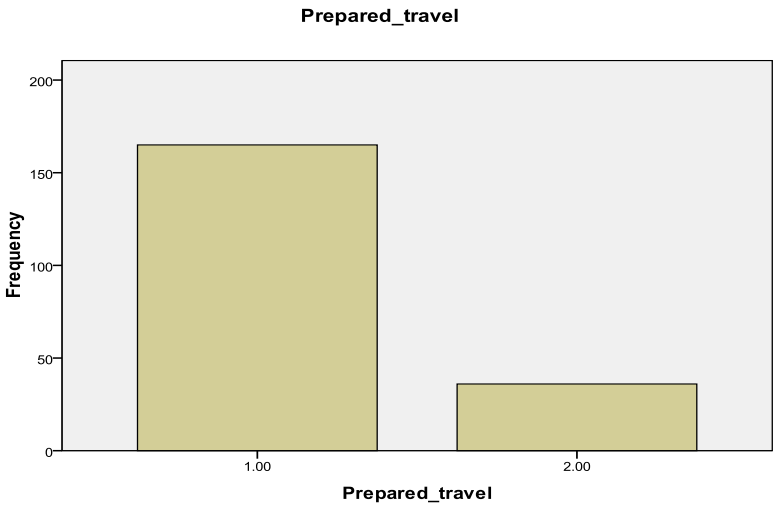

Figure 6.1 Whether or not respondents were willing to travel to attend a practical component of a course. [key: 1=yes; 2=no]

82.1% of the respondents were prepared to travel and 17.9% were not prepared to travel. The next step was to assess how far the respondents were willing to travel, the results of which are shown in Fig. 6.2.

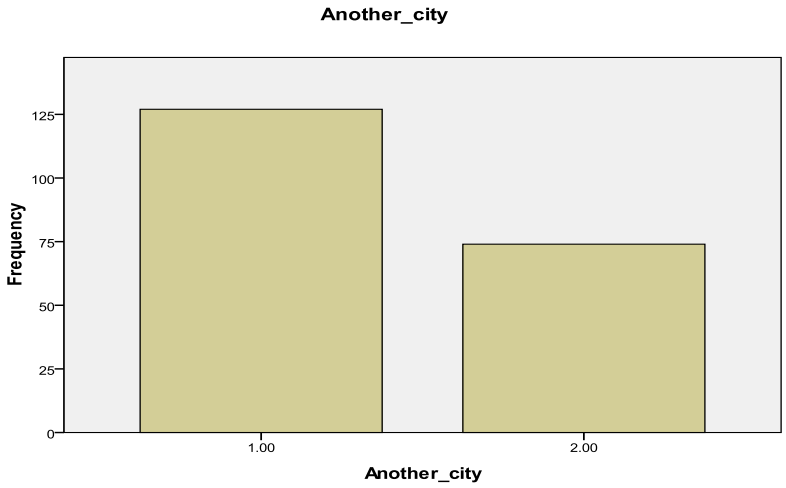

Figure 6.2 Whether or not respondents were willing to travel to another city to attend a course. [key: 1=yes; 2=no]

It was found that 63.2 % of the respondents (Fig 6.2) were willing to travel to another city for a CPD course.

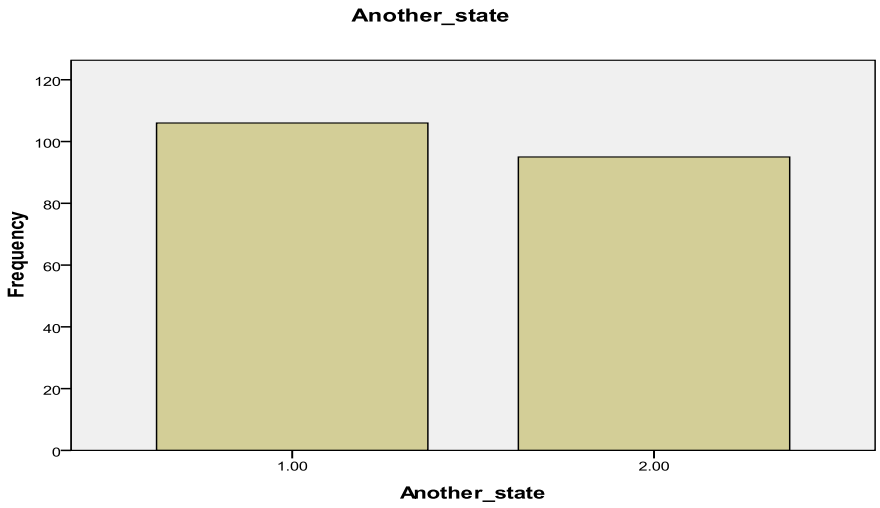

Figure 6.3 Respondents willing to travel to another state. [key: 1=yes; 2=no]

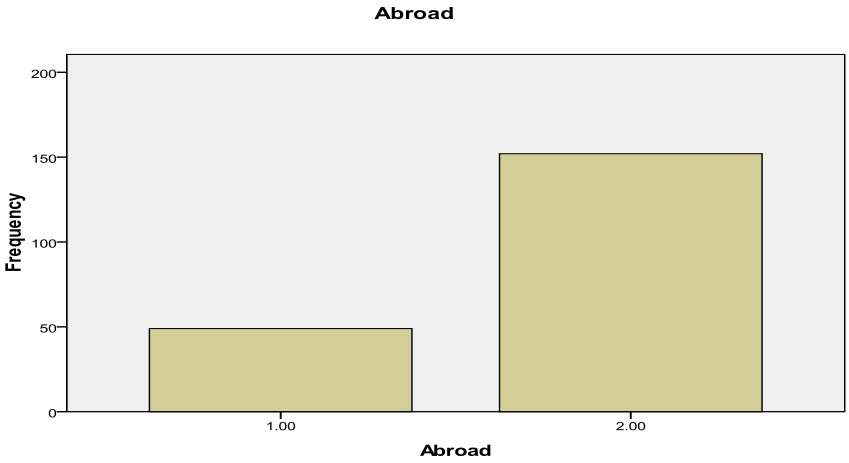

Figure 6.4 Respondents willing to travel abroad.
[key: 1=yes; 2=no]

It was also found that 24.4% were willing to go to another country (Fig 6.4).

The findings were significant because it established that in a distance education course, respondents were willing to travel even abroad to attend the practical component of a CPD course.

6.3 Background Characteristics

A chi square test was performed on the results of Q4 to find out whether gender, age, time since graduation and work-place had any effect on the respondents' willingness to consider an online course. A chi square test was chosen because a variable in a sample needs to be compared with distribution of variable in another sample. This test examined what is called null hypothesis to see if there was no significant difference between the expected and observed results. The results for this test are presented below.

6.3.1 Gender

Out of the 147 respondents, who said they would consider online courses, 58 were male and 89 female. Out of the 54 respondents who said no, 32 were male, 22 female (Fig 6.5). The chi square was 6.26 which was significant at the 0.05 level, df= 1, p= 0.01. Female students were more likely to consider online courses.

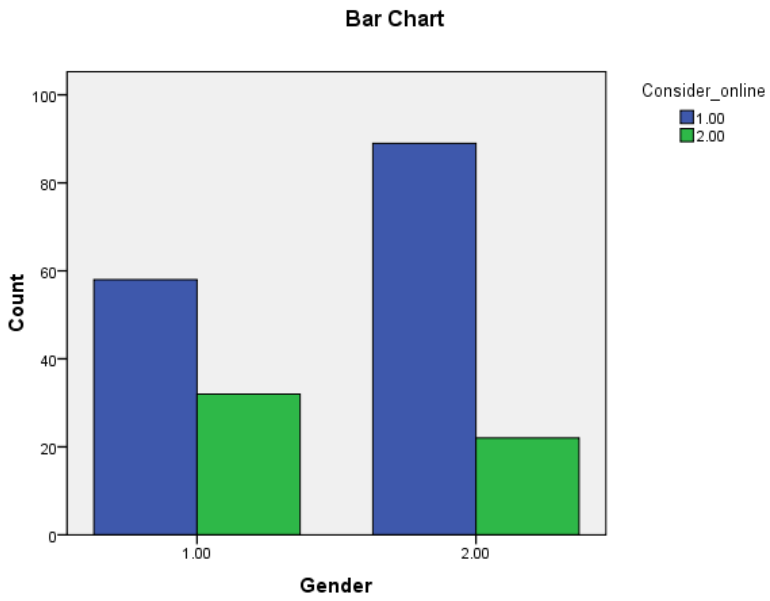

Figure 6.5 Respondents willing to consider online courses for their professional development.

[key1 (blue)=would consider online course; 2 (green) would not consider online courses; 1=Male and 2=Female]

6.3.2 Age

Out of 147 respondents who were willing to consider online courses, 25 were below 25 years of age, 62 were between 25-30, 23 were between 31-35, 15 were between 36-40, 22 were above 40 (Fig 6.6). The chi- square of 22.07, df =4 was found to be significant at the 0.05 level, $p<0.0001$.

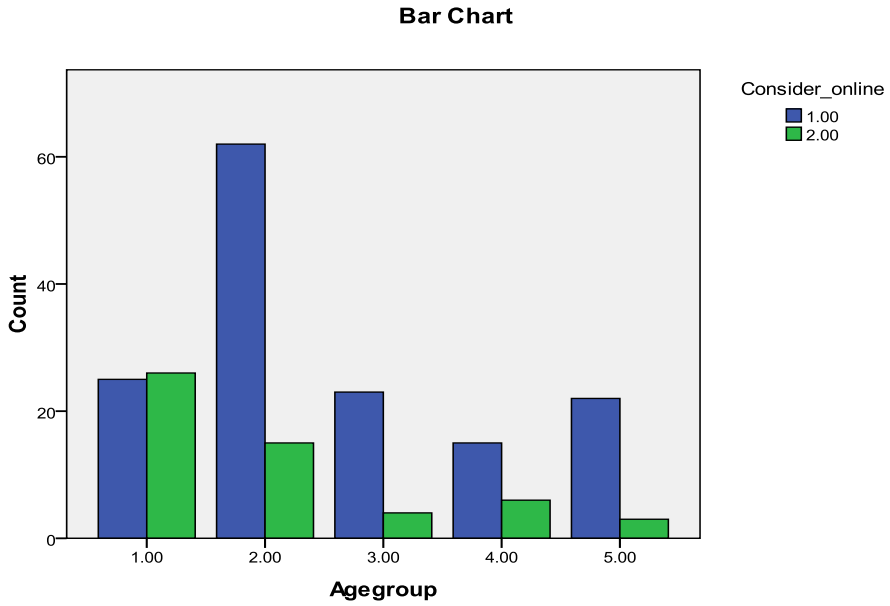

Figure 6.6 Respondents willing to consider online courses for their CPD.
[Key: 1=below 25 years of age; 2=between 25-30; 3=between 31-35
4=between 36-40, 5=above 40. blue=would consider online course; green=would not consider online courses]

6.3.3 Time since graduation

Out of 147 respondents who were willing to consider an online course, 75 had graduated less than 5 years ago, 30 between 5-10 years, and 42 after 10 years (Fig 6.7). The chi- square of 6.408, with df= 2 was significant at the 0.05 level, p=0.041

6.3.4 Workplace (place of employment) and consideration given to an online course

The chi-square between workplace and whether the respondents would consider an online course was 1.119, with one degree of freedom, p = .290 was not found significant at the 0.05 level of significance (see Fig. 6.8).

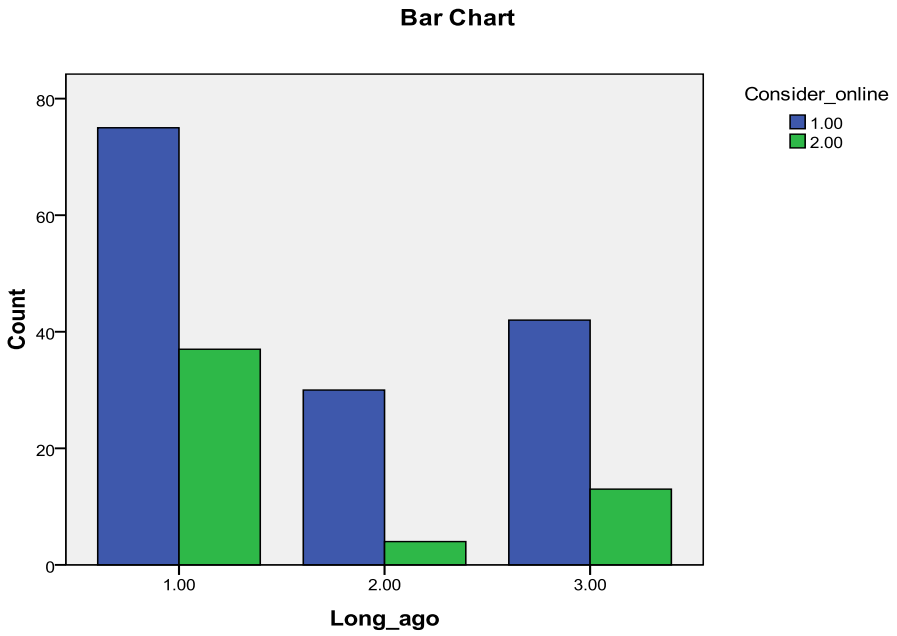

Figure 6.7 Respondents time since graduation

[Key: 1=less than 5 years ago; 2=graduated between 5-10 years; 3=graduated before 10 years]
[blue=would consider online course; green= would not consider online courses]

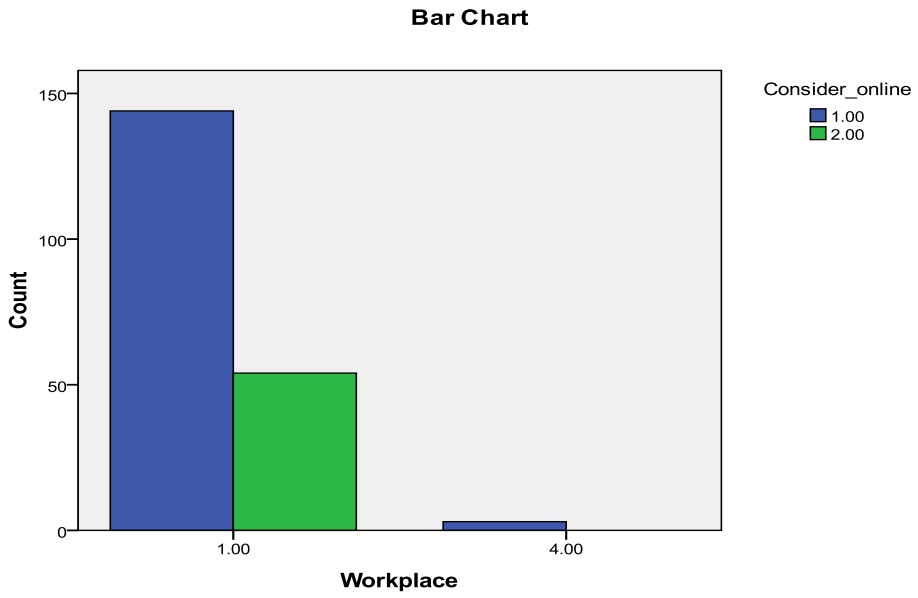

Figure 6.8 Respondents who would consider an online course relating to their work place

[Key: blue=would consider online course; green= would not consider online courses
Workplace: 1= General Practitioner 4=Others]

The association between considering a course online with various other factors mentioned above showed that there is a significant association between considering a course online and Gender, Age and Time since graduation. However, no association was found with workplace. This indicates that dentists interested in considering an online course were more likely to be females, in the age group of 25 to 30 and who have graduated less than 5 years ago.

6.4 Results relating to influencing factors and uptake of an online course

6.4.1 Access to High Speed Internet and Consider Online Course

These results shown in Fig. 6.9 show a statistically significant relationship between respondents considering an online course and access to high speed Internet (chi-square with one degree of freedom = 4.489, p = 0.034).

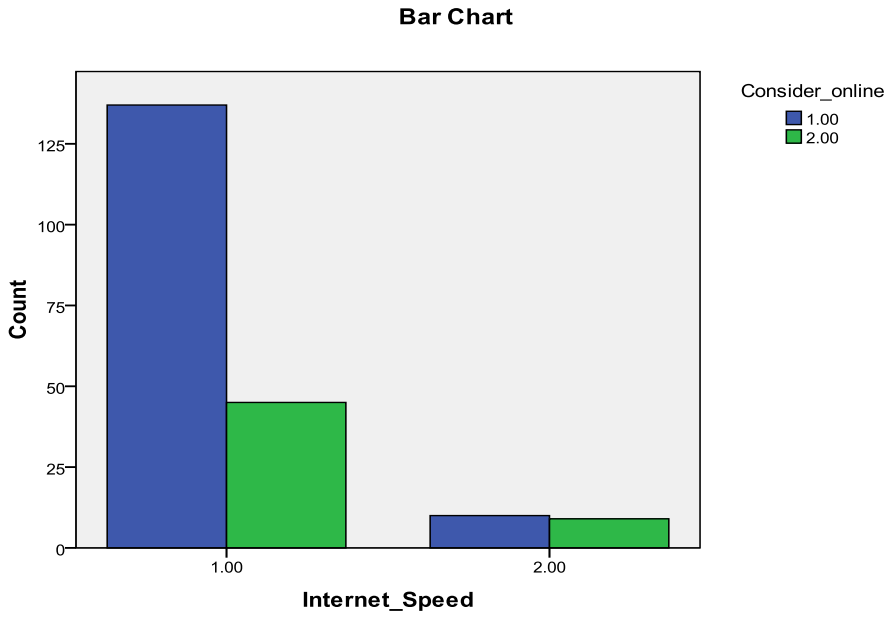

Figure 6.9 - Internet speed and consideration for online course
[Key: blue=would consider an online course; green=would not consider an online courses. *Internet speed: 1= High speed 2=No]*

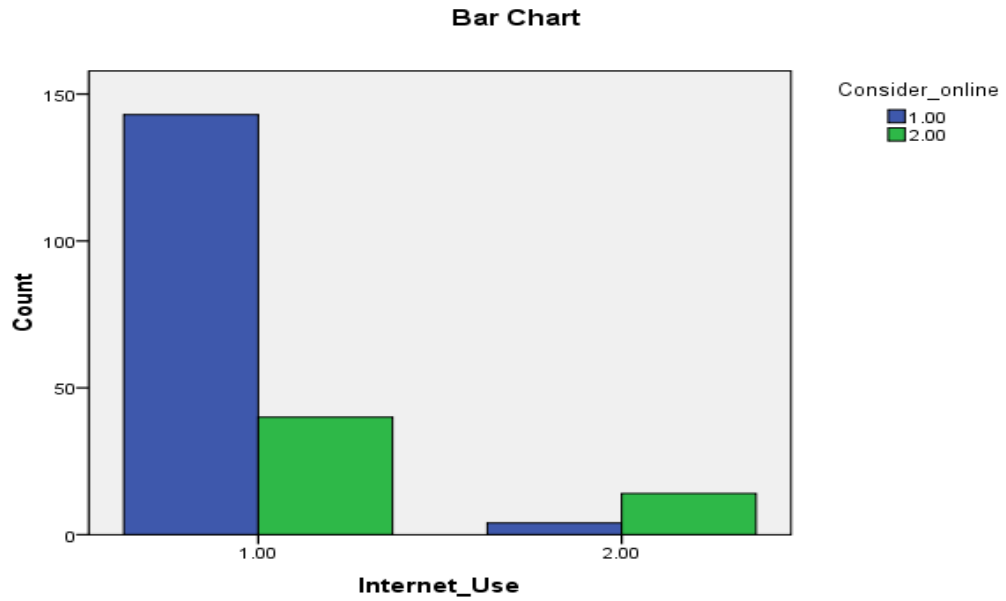

Figure 6.10 Internet usage and online courses

[key: blue=would consider online course; green=would not consider online courses. *Internet use: 1 = Yes 2=No]*

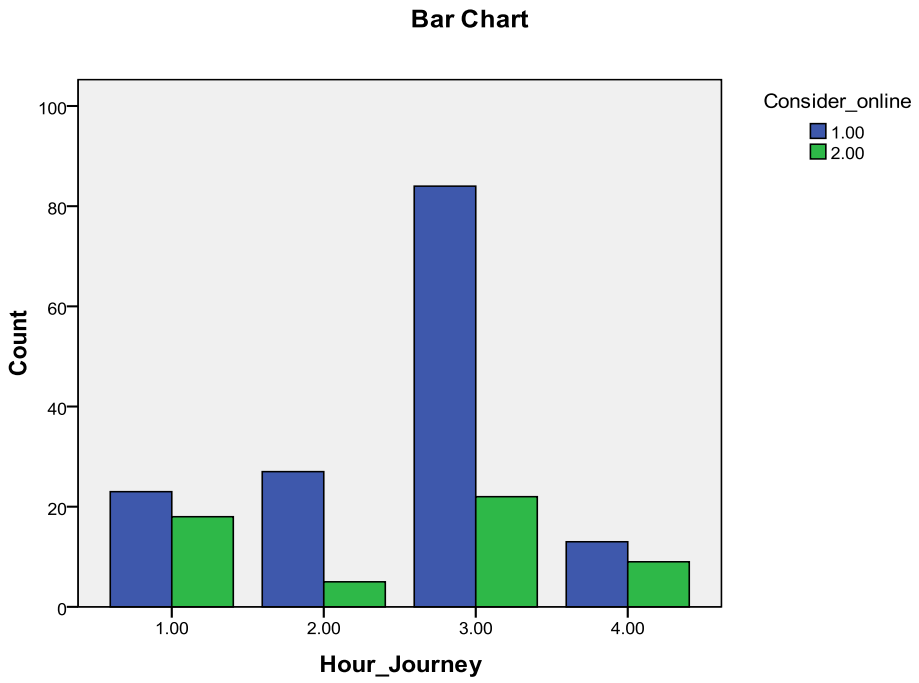

Figure 6.11 Journey time and willingness to attend an online course

[key: blue=would consider online course; green=would not consider online courses; Hour journey: 1=An international airport 2= National airport 3 = Mainline railway station 4= Major highway]

The chi-square between online course and Internet use was 26.082, with one degree of freedom and was found to be statistically significant at 0.05 level, $p < 0.0001$. (Fig 6.10)

6.4.2 Travel time, familiarity with CPD courses and online courses affect on uptake

The chi-square test between places that can be reached within an hours' journey and considering an online course was 12.338, with three degrees of freedom and was found to be significant at 0.05 level, $p = 0.006$ (see Fig 6.11).

6.4.3 Official requirement for considering Online Course

The chi-square between official requirement of the Dental Council for post-graduate study and considering an online course was 4.570 and was statistically significant at the 0.05 level, $p= 0.033$ (Fig 6.12).

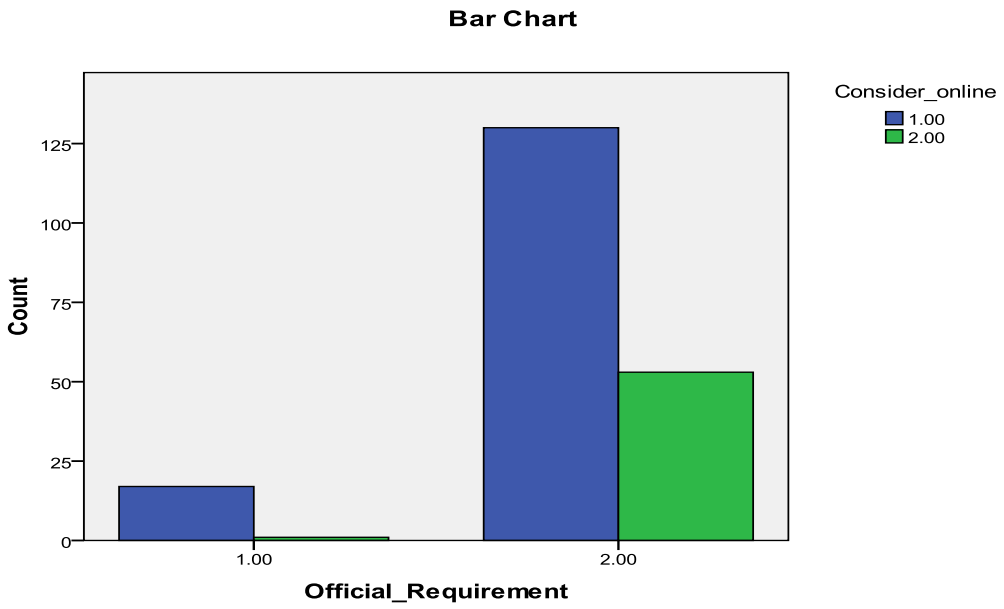

Figure 6.12 Official requirement of the Dental Council for CPD
[key: blue=would consider online course; green=would not consider an online course; Official requirement: 1=Yes 2=No]

6.4.4 Study days attended and Consideration of Online Courses

The study days for the respondents who were willing or not to attend an online course are shown in Fig. 6.13. The chi square test showed that there was a significant association (chi-square=8.04, p=0.045) between the respondents' willingness for the online course and the number of study days.

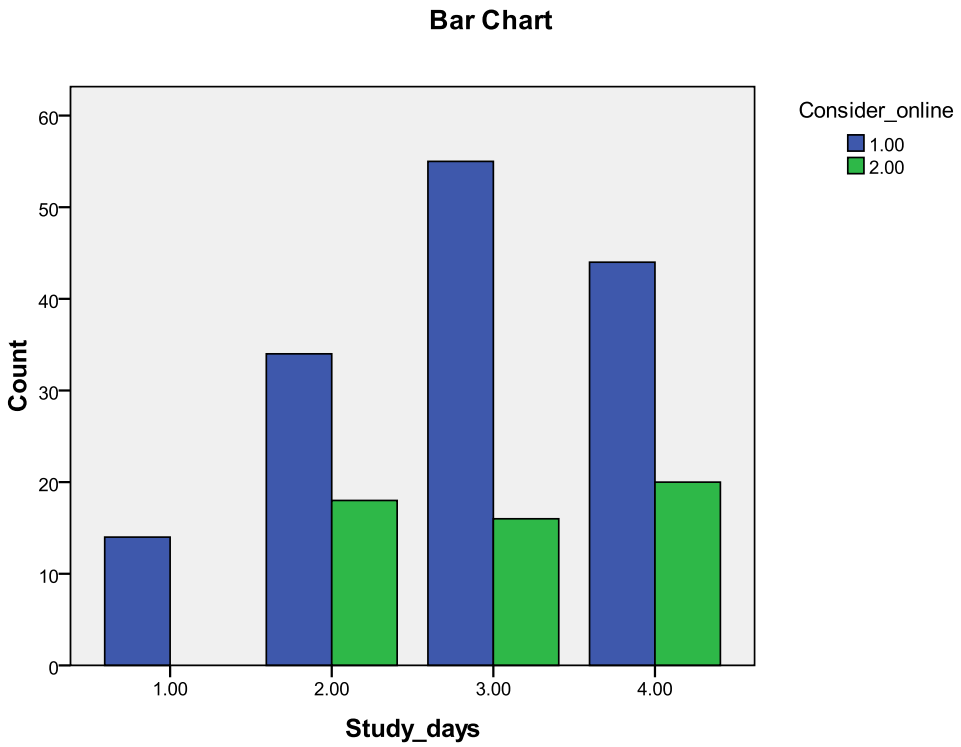

Figure 6.13 Number of study days per year versus willingness to attend an online course

[key: blue=would consider online course; green=would not consider online courses
Study days: 1=None 2=less than 10 days 3=10-20 days 4= more than 20 days.]

6.4.5 Attended an Online Course before and would consider another Online Course

The results in Fig. 6.14 show that there is no statistically significant relationship between having taken an online course earlier and considering another online course (chi-square with one degree of freedom = .505, p = 0.477).

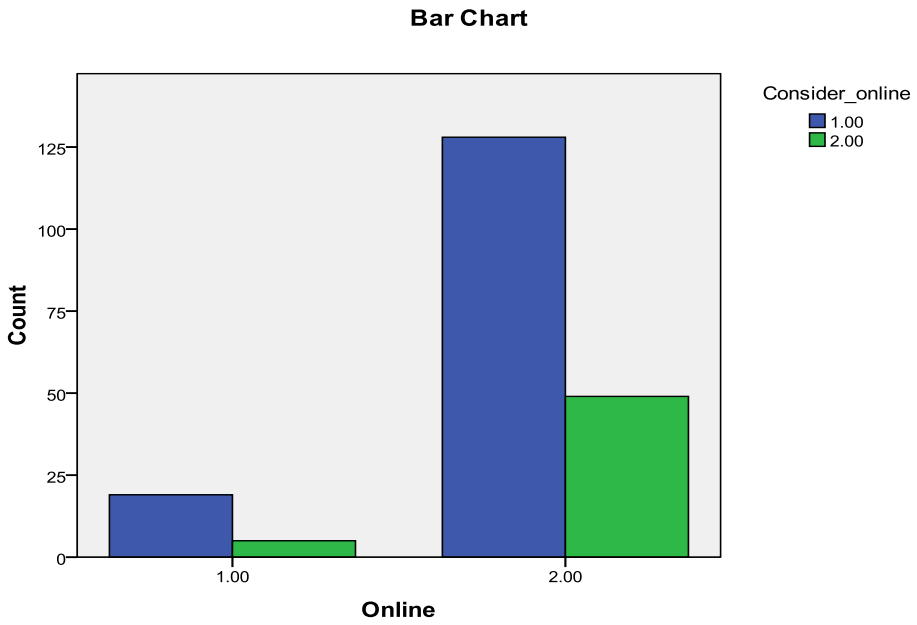

Figure 6.14 Relationship between previous course and interest in taking another one

key: blue=would consider online course; green=would not consider online course; Online: 1=Yes 2=No]

Based on the univariate analysis, further multivariate analyses were carried out using logistic regression to find out which factors influenced the dentists to consider an online course. The dentists' choice for online courses was considered as the outcome variable and gender, age group, time since graduation and workplace were included as the predictor variables in the logistic model. The results are summarized in the following table.

Table 6.2 Results of logistic regression

Predictors	Reference group	Odds ratio	95% CI* LCL	UCL	p value
---					
Age group					
25-30	<25 yrs	4.92	2.04	11.89	<0.0001
Gender					
Female	Male	2.47	1.20	5.09	0.01
Workplace		-	-	-	0.99
Long ago					
5-10 yrs	< 5yrs	0.38	0.10	1.52	0.99

Values could not be calculated due to small numbers.

*UCL=Upper control limit: LCL=Lower control Limit

The result shows that the age group and the gender are the significant predictors of considering an online course by the dentists. Dentists within the age group of 25-30 years are 4.92 times more likely to consider an online course when compared to their counterparts in the age group of <25 yrs. Female dentists are more in favor of online courses than their male counterparts. However, the work place and the time they graduated are not significant factors in considering an online course.

6.4.6 Prepared to Travel

The background characteristics were gathered from responses to question items- age group (Q1.1), gender (Q1.2), how long ago they completed their bachelor's course, place of work, Internet access, and familiarity in using the Internet to seek information on professional matters. A significant association ($p<0.05$) between these two variables was observed.

6.4.6.1 Age Group and Being Prepared To Travel

There was no statistically significant relationship found between age group and preparedness to travel (chi-square with four degrees of freedom = 2.566, p = 0.633).

6.4.6.2 Prepared to Travel and gender

The results shown in Fig. 6.15 show that there was no statistically significant relationship between preparedness to travel and gender (chi-square with one degree of freedom = .615, p = 0.433).

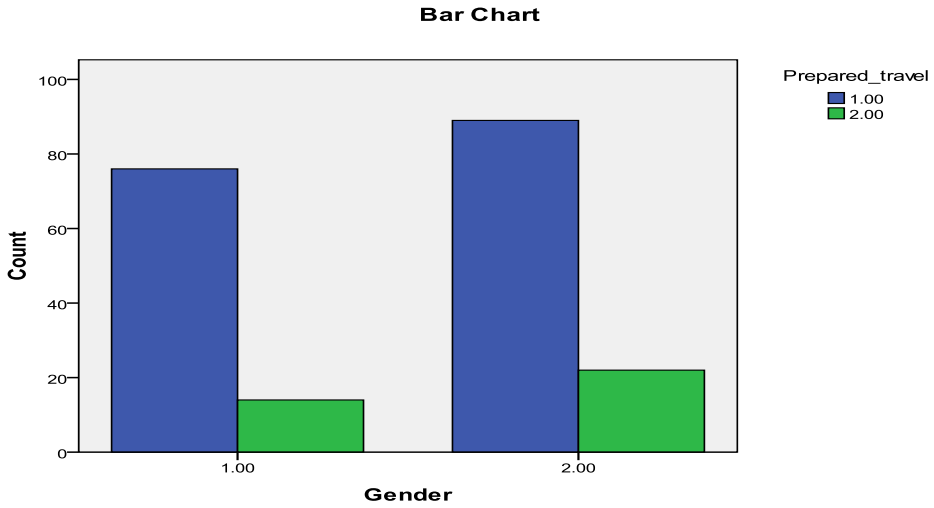

Figure 6.15 Preparedness to travel relating to gender
[Key: blue=be prepared to travel; green=would not be prepared to travel; Gender 1=Male 2=Female]

6.4.6.3 Workplace versus prepared to travel

The results shown in Fig. 6.16 show that there is no statistically significant relationship between preparedness to travel and workplace (chi-square with one degree of freedom = .664, p = 0.415).

6.4.6.4 Preparedness to travel and places that can be reached within an hour's journey

The results shown in Fig. 6.17 show that there was no statistically significant relationship between preparedness to travel and places that could be reached within an hour's journey (chi-square with one degree of freedom = 5.307, p = 0.151).

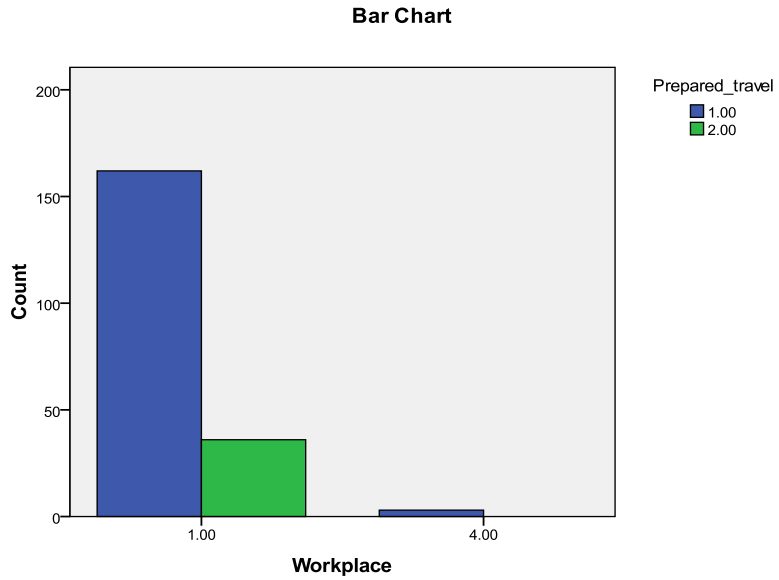

Figure 6.16 Preparedness to travel relating to work place (general practitioner, hospital, university, other)

[Key: blue=would consider online course; green= would not consider online courses *Workplace: 1= General Practitioner 4=Others]*

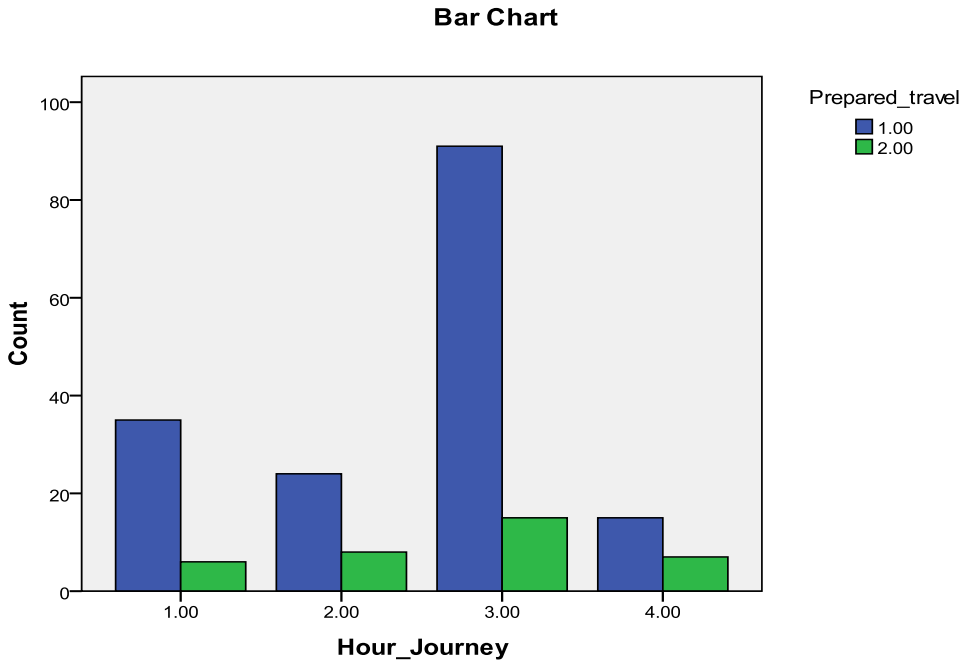

Figure 6.17 Preparedness to travel up to an hour to attend CPD according to mode of transport

[Key blue= Yes green=No; Hour journey: 1= An International airport; 2= National airport; 3=Mainline railway station; 4= Major highway]

6.4.6.5 Official Requirement to take Online Course and Prepared to Travel

The results shown in Fig. 6.18 show that there is not statistically significant relationship between official requirements for the correspondents to follow CPD courses and preparedness to travel (chi-square with one degree of freedom = 1.309, p = 0.253).

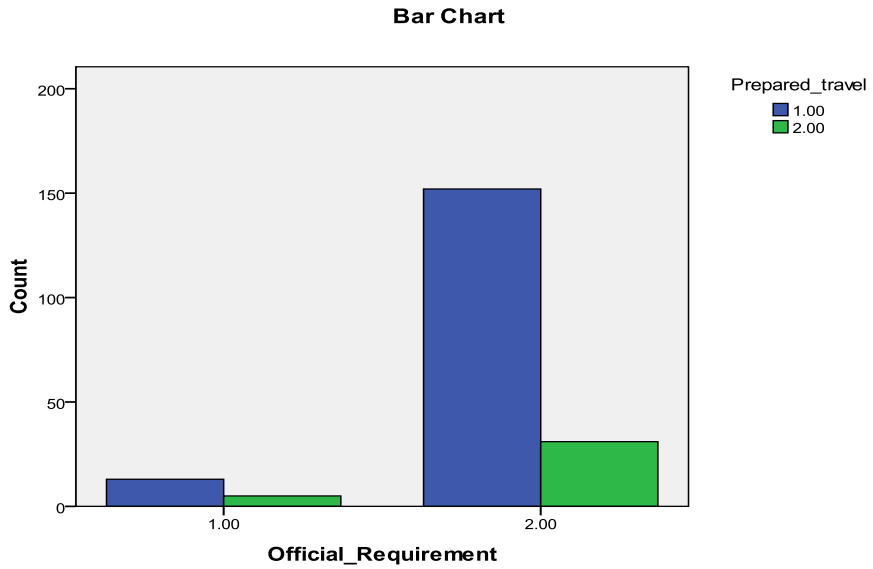

Figure 6.18 Preparedness to travel and official requirement to attend CPD
[Key: blue=would travel to CPD course; green= would not travel to CPD course
Workplace: 1=official requirement: 2= no official requirement]

6.4.6.6 Number of study days attended in a year and prepared to travel

These results indicate that there was no statistically significant relationship between study days attended and preparedness to travel (chi-square with three degrees of freedom = 6.821, p= 0.078).

6.5 Conclusions for Q4 survey

The conclusions for Phase 3 of the study relating to the Q4 results are discussed below.

6.5.1 Factors which influenced the respondents' decisions to follow an online course

Factors which were found to be significantly related to the factor 'consider an online course' were: gender; age; time since graduation; Internet use; Internet access; places that can be reached within an hour; official requirement to take CPD course and study hours spent in courses in a year. However, there was no significant relationship between work place and whether they had taken an online course earlier and dental surgeons' considering an online course. It is interesting to note that none of the factors such as Age group, Gender, Work place, Places reached within an hour of journey, official requirement and study days attended were significantly associated with the participants preparedness to travel. It shows they would be willing to travel even abroad for practical components of a course, or to another State in India.

6.5.2 Attitude

The respondents also provided evidence of their attitudes towards CPD. The ability and confidence with online learning technology, learners' attitudes to CPD, their preference for specific subjects, teaching styles, teaching-learning environments which facilitated interaction among learners were found to be other factors that were considered as vital for the uptake of distance education through online courses.

6.5.3 Learner Attitudes

According to the Theory of Planned Behaviour (TPB), any new behaviour will occur only when there is a strong intention to perform that behaviour. Individual intention (I) in turn is explained by three factors (i) Attitude towards action (AACT), (ii) Subjective norm (SN) and (iii) Perception of Behavioural Control (PBC). The

Attitude towards Action is based upon weighing the advantages and disadvantages associated with the performance of a given behaviour by the individual. SN depends on the individual's perception of whether significant others would approve or disapprove of the behaviour in question. The third aspect is the extent to which an individual believes that she or he has the resources and opportunities required to perform the behaviour, which is referred to as perception of behavioural control (PBC). These factors were considered when concluding the results of the phases of this PhD research discussed in the following section.

6.5.4 Analysis of attitude questions

Question 2.1 had examined twelve attitudes of the students towards CPD. In order to find out which of these attitudes determine whether students would opt for an online course, a chi-square test was performed between each of the items and the item "consider online course" (question 2.6). The results of the chi-square are summarized in Table 6.3 below.

The results in Table 6.3 show the association for the respondents' intentions to consider enrolling on an online CPD course relating to their beliefs towards CPD namely: they considered Continuing Professional development (CPD) as important; CPD was important in their career development; CPD kept them up to date with developments; however, CPD was too time consuming; theoretical concepts could be delivered adequately online via the Internet; they believed that their Dental Councils considered CPD to be important; and that their patients might consider their CPD to be important.

Table 6.3 Association between Intention to consider an online course and beliefs towards CPD

Null Hypothesis The intention to consider an online course is independent of the belief that:	**Chi-Square**	**p value**	**Hypothesis**
Continuing Professional development (CPD) is important	25.61	<0.0001	Rejected
CPD is important in your career development	9.97	0.019	Rejected
CPD keeps you up to date with developments	19.87	<0.0001	Rejected
CPD is too time consuming	14.40	0.006	Rejected
Acquiring CPD via reading journals is adequate	3.06	0.547	Failed to Reject
CPD via a recognized course is more useful	4.10	0.250	Failed to Reject
CPD delivered by a distance-learning programme with a practical component is adequate	3.70	0.448	Failed to Reject
A distance-learning programme must be recognised by your Dental Council	6.56	0.087	Failed to Reject
Theoretical concepts can be delivered adequately online via the Internet	15.97	0.003	Rejected
Your Dental Council considers CPD to be important	8.76	0.033	Rejected
Your fellow professionals consider to be important	4.54	0.209	Failed to Reject
Your patients consider CPD to be important	12.24	0.016	Rejected

The results in Table 6.4 show that students consider the following factors to be important when choosing an online course: cost, avoiding travel, length of course, worldwide status of the institution delivering the course, course having a hands on practical component, a distance-learning programme with a practical component and an online component and recognition of the course by Dental Councils in other countries. For those correspondents who chose not to follow an online course,

analysis showed that out of the 201 respondents, 54 respondents had answered 'No' to Question 2.7, i.e. they do not wish to consider an online course (Table 6.5).

Table 6.4 Association between Intention to take an online course and other factors

Null Hypothesis The intention to consider an online course is independent of the belief that:	**Chi-Square**	**p value**	**Hypothesis**
The topic is important	.62	0.43	Failed to Reject
Cost is important	12.16	0.007	Rejected
Avoiding travel is important	11.55	0.02	Rejected
Avoiding spending an extended period away from home is important	3.66	0.46	Failed to Reject
The length of the course is important	16.24	0.001	Rejected
Recognition of the course by your Dental Council is important	1.46	0.69	Failed to Reject
Where the course is held is important	6.86	0.08	Failed to Reject
Worldwide status of the institution delivering the course is important	17.00	0.002	Rejected
A hands on practical component is important	10.36	0.02	Rejected
A distance-learning programme with a practical component and an online component is desirable	16.08	0.001	Rejected
Not travelling away from home for CPD is desirable	9.40	0.052	Failed to Reject
Recognition of the course by Dental Councils in other countries is desirable	14.50	0.006	Rejected

Table 6.5 Distribution of scores [for those who do not wish to consider online courses]

	Percentage of respondents				
Reason for not taking online course	**strongly disagree**	**Disagree**	**uncertain**	**agree**	**strongly agree**
Unfamiliar	27.8	48.1	9.3	13	1.9
no confidence	16.7	20.4	27.8	33.3	1.9
Internet facility	5.6	27.8	24.1	37.0	5.6
Cannot sit	7.4	9.3	13	48.1	22.2

(1 – Strongly disagree, 2 – Disagree, 3 – Uncertain, 4 – Agree, 5 - Strongly agree.)

6.5.5 Conclusions to attitude survey questions

What appears clear from the above findings is that when it comes to considering a theoretical component, the status of the course is not as important as probably the topic, location or cost. However, when specifically asked whether they would be prepared to travel, then the recognition, status and recognition from other countries far overruled other considerations as they had to specifically set aside time from their profession to attend the practical component. Their profession was at stake by attending the practical component or not. However, the third and fourth factors were less important as travel cannot be avoided and the course having both components is necessary.

CHAPTER 7: CONCLUSIONS

7.1 Introduction

This final chapter provides a concise review of the statement of the research problem, methodology, instrumentation, data analysis procedures and main findings of the study. This PhD study is the largest survey to date which has identified the significant influences on professional dentists working in different settings to take up CPD, including through blended learning programmes. The majority of the previous empirical research studies reviewed in Chapters 2 and 3, although providing useful evidence has mainly been at the formal university education settings and not much has yet been reported until this PhD study of professional dentists in the work-place. A summary of the findings presented in Chapters 5 and 6 are given below relating these to previous evidence from the relevant professional development literature followed by a discussion of the limitations of the research. The final section of this chapter provides implications and recommendations for further research in this field.

7.2 Statement of the Problem

The questions for which answers were sought in this study and addressed were:

a) What were the most important factors which encouraged and enabled professional dentists to follow CPD through distance education courses?
b) What were the barriers which prevented them from continuing with their professional development through on-line distance education courses.

7.3 Methodology

The methodology involved several sequential questionnaire surveys which were designed and developed from the analysis of the variables identified by a

review of the previous empirical research and from the well researched Entwistle (2004, 2005) model of the factors which influence students' learning in higher education.

7.3.1 Population and Sample

The populations for this study consisted of: (a) 23 Post-graduate students following the Masters in Clinical Dentistry for the first pilot phase; (b) 23 dental surgeons in a Dental School in India attending a seminar for the second pilot questionnaire survey; (c) 116 dentists (dental practitioners, post-graduates and teachers) for the first main phase of the large survey and finally (d) 201 dental surgeons from 20 districts of India using a questionnaire based on analysis and revisions to the previous three questionnaires and the Theory of Planned Behaviour. These findings were collected and analysed over a period of six years to achieve the answers to the research questions.

7.3.2 Instrumentation

All four questionnaire surveys [See Appendices for Q1-4] were conducted in sequence to query the respondents' perceptions and reasons which either encouraged or discouraged them to follow distance education courses and their perceptions of the utility of distance education courses to overcome the perceived barriers. The first two surveys of small samples of professional dentists were conducted to identify the range of factors which might influence these enablers and barriers initially identified from the previous research findings (Chapter 2) and deduced from the theories discussed in Chapter 3. These included the course quality compared with traditional courses, cost of travel, reliability of the delivery technology, international status, effects on the family and willingness to travel to attend practical classes.

The third survey (n=116) involved a larger refined questionnaire surveying a cohort of Indian professional dentists from different professional settings but mainly in one district of India: general practitioners (4.3%), hospital (43.5%) and university clinicians (52.2%) to obtain their opinions about all the factors previously identified. The final cohort (n=201) included dental surgeons from different Indian districts and professional settings (general practitioners (55%), hospital (20%) and university clinicians (25%))

7.3.3 Results of the 3 phases of the study

The results of the PhD study are discussion in Section 7.4 below. The Phase 1 – 3 survey data which were collected, were analysed firstly to determine the percentage of respondents' attitudes towards specific important factors and secondly using the statistical package SPSS to identify the most significant variables in relation to the two research questions.

The Phase 1-2 (Q1-Q3) results presented in Chapter 5 showed the following:

a) The large majority of respondents thought that CPD was very important for their career development, the most positive of these were those working in general practice;
b) The four most important factors influencing them to take up a CPD course were:

1. The importance of the topic;
2. Recognition of the course by their National Dental Council;
3. The world-wide status of the course being provided;
4. The course includes a practical component.

The following factors were also considered important by the majority of respondents:

1. Cost;
2. Recognition by another Dental Council;
3. Location;
4. Course length.

The general opinion was that CPD could be obtained adequately via a Distance Education Programme with a practical component. Despite the limited experience of online courses (only 13% of respondents had participated in one) around 80% said they would consider undertaking one. A significant proportion (78%) of the respondents agreed that they would consider a course where the theoretical aspects were delivered directly to their computers over the Internet. Most respondents would be prepared to travel to attend the practical component of a DLP/CPD course; 78% would be willing to go to another city, 49% abroad, and 29% did not have any preference.

For the respondents, the location of a CPD course was important and especially females, who were over 30 years, felt it was desirable to avoid regular travel. The majority would be prepared to travel to attend the practical component of a CDP course, however; half would be willing to go abroad and almost 80% to another city.

A small proportion, which consisted of the younger respondents, preferred travelling as an element of attending a CPD programme. Female respondents on the whole, were significantly more likely to be willing to travel abroad than males for a specific component of the programme but not on a regular basis.

Another significant finding was that the perceived barriers and enablers were dependent upon the age of the respondents. The strongest preference for CPD was

seen in those aged over 30, of whom over half would choose a two-year course leading to a Diploma.

In general, the younger respondents in this PhD study were more willing to consider a longer-term course.

The results from this study presented in Chapter 6 showed that the barriers to distance-learning were largely technology related:

I. Unable to sit for long hours on the course (at a computer);

II. Low Internet speed;

III. No confidence (in using computers);

IV. Unfamiliar with the usage of computers and using the Internet.

There were various factors which were significantly related to the uptake of online courses. The factors, discussed in the following section, were: gender, age, time since graduation, Internet use, Internet access, destination that could be reached within an hour; official requirement to take a CPD course, and study hours spent in courses in a year. The results showed that while several factors affected whether the dental professionals would consider an online course, the following factors were not considered important:

- Their preparedness to travel from home.

- Topic.

- Recognition by the Dental Council.

- Location of the course.

- Recognition of fellow professionals considering it important.

7.4 Summary and Discussion of the Findings

The summary and discussion of the findings pertaining to the two research questions from the data collected are given below.

Question 1- What were the most important factors which encouraged and enabled professional dentists to follow CPD through distance education courses?

Overall, respondents showed that gender, age, practical component, use of the Internet and access to it, and the curriculum content (topic) were the most important factors affecting their consideration of CPD through distance education courses.

Gender: Regarding gender, female respondents on the whole were significantly more likely to be willing to travel abroad than their male counterparts. It appeared that female respondents may have found travel itself attractive but extended periods away from home were less appealing to them. This could be due to women having a greater commitment to CDP study as was found in an earlier study by Jones et al. (2003) discussed in Chapter 2, who showed that female students completed courses more often than older males who were more likely to withdraw before finishing. However, other previous research studies discussed in Chapter 2 showed that females preferred to learn in a connected manner (Belenky, 1997, MacKeracher, 2004) which suggests they consider the face-to-face component (for which they would have to travel) of a blended learning CPD course more important than their male colleagues, so are more prepared to travel to attend it.

Age: Regarding the age of the respondents, the length of the course preferred by respondents varied with their age. The strongest preference was seen in those aged over 30 years, of whom over half would choose a two-year course leading to a

Diploma. In general, the younger respondents were more willing to consider a longer course.

Practical component. With respect to CPD courses with a practical component, respondents believed that a practical component was an important part of a CPD course, and in general were wary of acquiring CPD by reading journals alone compared with evidence from some previously reported studies (see Chapter 2, Section 2.4.12) which reported professionals preferring to keep up to date through reading journals and looking information up online. In general, respondents agreed that CPD could be obtained adequately via a Distance Education Programme with a practical component.

Access to the Internet: Regarding the use and access to the Internet, despite the limited experience of online courses (only 13% of respondents had participated in one) around 80% said they would consider undertaking one. Even though there were a few technological barriers reported by many of the respondents, they were well IT connected, with 85% having access to high-speed Internet facilities which is significantly higher than reported in previous earlier research studies (e.g. see Chapter 2; Section 2.4.12; Gagnon et al., 2007). The highest percentage among respondents having already participated in an online course (33%) was found among those working in hospitals, which were most likely to be officially required to undertake post-graduate education. 63% of the respondents without high speed Internet access were also equally enthusiastic about online courses, but appeared to be discouraged by the need to download material.

The results showed that compared with the general Indian population, professional dentists were more likely to use the Internet at home and significantly less likely to access the Internet at work. There are few studies comparing different

health care practitioners' use of computers and the Internet. An earlier literature review of health care professionals' use of the Internet for continuing education discussed in Chapter 2, found that the majority had access to computers at home, work, or both and that the Internet was increasing in popularity (Cobb, 2004). This PhD research shows that even in a developing country like India, access to the Internet for CPD for professionals is now 90%.

Official requirement of the Indian Dental Council: Also, affecting the uptake of CPD courses were factors such as whether CPD was considered an official requirement by the Dental Council of India, and their previous exposure to online courses. Several policy makers have envisioned that technology will play an essential role in educating health care professionals for a reinvigorated health care system. This premise is predicated on the assumption that professional dentists access and use computers and Internet technology for their ongoing continuing professional development.

Professional position: An important outcome from this research from the Q3 and Q4 surveys (Chapters 5 and 6), not previously reported in the literature, was that some of the CPD preferences were dependent upon the professional position (general practice, hospital, university) of the potential CPD students. The respondents working in universities were the least likely to believe that CDP was important for career development and said it was too time consuming whereas general practice and hospital workers disagreed that CPD was too time consuming. Furthermore, respondents working in general practice were significantly more willing to travel to another city than those working in universities, although it is possible that respondents working at universities had insufficient time for CPD (see below) or felt they had CPD available in their own city compared to some general practitioner

respondents who could be working in isolation in small towns with few colleagues from whom they could update their knowledge and skills.

Cost of CPD: It was also concluded that the cost of the course, location where the practical course is offered, recognition by other Dental Councils, and the length of the course were also important factors that were considered to be encouraging to a professional dentist to take up CPD through a distance education programme.

Course topics: The respondents were also asked specifically what kind of course they preferred: whether they would like a course with a practical component or a distance-learning component with theory online and practical face-to-face sessions and for which particular topics. An earlier study by Casebeer et al. (2002), discussed in Chapter 2, had previously found that the content had to be seen to be relevant, immediately available, credible, and easy to find and use. In most cases, the primary purposes for using the Internet given by healthcare professionals in their research included: information retrieval, supporting direct patient care (Casebeer et al., 2002), and e-mail communications.

The PhD results showed that over 73.1% of the respondents would opt to follow an online course. Bennett et al (2006) found that healthcare professionals tend to use online continuing professional development for professional communication, information seeking, and courses. Health care professionals used the Internet to search for the latest research about a variety of topics as well as to obtain information about diseases, specific patient problems, drugs, new therapies, and different products (Bennett et al., 2006). The majority of respondents to Q3 (see Section 5.5.2) and Q4 (see Table 6.4) reported that the specific topic was important regarding their decision to follow a CPD programme. This is expected since firstly,

professional dentists' undergraduate training various across different universities and final year (usually 5th) options and secondly, depending upon their subsequent professional practice they will have different CPD needs to enhance further their knowledge and skills

Therefore, in conclusion, for dental practising professionals, the opportunity to embark upon a CPD programme delivered by blended learning, which includes an online component, will depend upon the work and home technology resources. This, in turn, will vary according to the type of dental work they do. In the case of dentists working in individual or group practices then access to the work computer and/or a reliable networked home computer, will determine whether or not they have adequate IT resources to be able to follow a blended learning courses successfully.

Question 2- What were the barriers which prevented them from continuing with their professional development through on-line distance education courses?

While many potential benefits to using computer-based technologies have been identified in the literature review, previous researchers also cautioned about potential obstacles for physicians such as time, computer capability (Mamary & Charles, 2000, 2002), limited training and skills, relevance to their practice, and Internet experience (Casebeer et al., 2002; Harris et al., 2003). Moreover, the preference for face-to-face communication and the reliance on print-based sources may also act as a barrier.

In their third study of continuing education (on self-directed learning amongst Physicisans) Mamary and Charles' (2003) found the main reasons given by the subjects for not using computer-based continuing education were the physicians' preference for in-person instruction and not knowing how to use computer based

technologies. They also found that the key barriers with online learning included the lack of time and access to computers and databases at work, whereas colleagues found books to be easily accessible, easy to use, and trusted sources.

The results presented in Chapters 5 and 6 showed that the most significant barriers as perceived by respondents were: (i) cost; (ii) distance of travel for the practical component which was considered to be important; (iii) insufficient time to follow all components; and (iv) non recognition by the Dental Council.

Cost: Previous research has mostly considered the cost of distance learning from the providers' perspective as a benefit because it saved money in the longer term. For example, several studies (See Chapter 2 Section 2.1.4, e.g. Willis, 1993, French, 2006, Grant, 2011) have identified 'cost' as a major reason for developing and delivering CPD through distance learning. Conversely, cost-related challenges for participants following traditional CPD reported previously (see Chapter 2, e.g. Penz et al., 2007) included not just the cost of travel or the programme itself, but the need for additional child care, time off from work, and an insufficient number of professional dentists to cover a shift when one or more want to take time away for CPD.

This PhD study investigated the effects of 'cost' as a possible barrier to professional dentists embarking upon a blended learning CPD programme. The results of the pilot survey (Q1) (n=23), Q3 (n=116) and Q4 (n=201) Tables 5.7 and 6.4) reported that 'cost' was a significant factor influencing their decision to enrol on a blended learning CPD programme, and could bar them from enrolling, particularly the high cost of having to travel to face-to-face sessions. However, where much of the course could be delivered online then this would result in lower overall costs compared to traditional face-to-face CPD for the course participants because they

would not have to travel regularly to a centre which could be a long distance in India for a traditional face-to-face CPD programme. In conclusion, Cost was seen to be an important consideration but not as a barrier for most respondents.

Distance of travel for the practical component: The inclusion of a practical component of CPD dental programmes was considered important by the large majority of the Indian respondents to Q3 and Q4 but this could be a barrier if the dentist had difficulties in meeting this requirement. 50% of respondents to Q3 and 83.1% for Q4 were prepared to travel abroad for the practical component, so travel for the majority was not perceived as a barrier to attending the CPD face-to-face component. However, those in general practice were the most willing to travel to another city (95%), but unwilling to travel abroad (only 33%) whereas hospital employees were the most willing to travel abroad (62%), followed by those in universities (52%). However, insufficient time to be able to travel to attend the practical component was a barrier for a minority of the respondents in both of the large surveys.

Insufficient time to attend face-to-face sessions: The result from my PhD research show that 48% of university employed dentists perceiving having to travel abroad for the practical component as a barrier could be due to their time being constrained by more rigid time tables and inflexible working arrangements compared to those of their general practice colleagues who were mainly self-employed.

Non-recognition of CPD programme by the Dental Council: As was reported by the respondents of Q3 and Q4 in the previous section above, the majority considered that ‘recognition by the relevant dental council’ was an important factor in encouraging them to choose a particular course. Therefore, by deduction, ‘non

recognition' by the relevant authority could be considered to be a possible barrier to the take up of a particular CPD programme for professional dentists.

The findings showed that the majority of respondents would be willing to follow a blended learning programme where the theoretical component was provided through distance education, where the course was considered to be of a high status as well as the topic being relevant to the respondents CPD needs.

Factors, which could pose barriers to taking up blended learning CPD, included the location and the possibly high cost. However, when their willingness to travel was considered, then the recognition, status and recognition from other countries far overruled other considerations as they had to specifically set aside time from their professions to attend the practical component. Regarding learners' preferences for the duration of courses the respondents' specific preferences with respect to course duration and type of subject showed that the majority preferred a three-year course and 100% of the respondents preferred it in radiology.

The results from my research regarding the 201 responses from the final survey (Q4 – Chapter 7), showed that the characteristic of the professional setting for those in general practice were most likely to want to enroll on an online course in CPD (see Fig. 6.8, Chapter 6). The overall results discussed above further confirms the previous research conducted by Sen and Samdup (2009) and Bhushan (2008) (see Chapter 2; 2.1.4) who showed that the concept of Distance-Education rests on recognising the presence of multiple and varying contexts of learners, learners' characteristics and professional positions, which need to be addressed through responsive course content creation and delivery strategies.

7.5 Benefits

Several benefits in this PhD study were identified to using computers and Internet technology for continuing professional education. These benefits fall into two categories - practical benefits and learning enhancements also previously discussed in Chapter 2, deduced by e.g. Fozdar et al. (2006), French (2006), Grant (2011). Practical benefits include time flexibility and time saved travelling to courses. However, the results from my study showed that the majority of the respondents were prepared to travel even abroad to cover the practical components of a course implying that travel is not necessarily a barrier to CPD programmes.

7.6 Barriers

The barriers to using computers and the Internet previously reported in Chapter 2 and discussed above, can be grouped into four categories: access to a computer and the Internet, learning preferences, professional concerns, and knowledge and skills:

Access to a computer and the Internet includes computer access, convenience and capacity (IGNOU, 2003; Harris et al., 2003), Internet access at home or at work (Cobb, 2004; Panda & Mishra, 2007), connection speed or lack of high speed Internet, technical difficulties or issues (Cobb, 2004; Bennett et al., 2005; Bennett et al., 2006), and software requirements (Bennett et al., 2005; Bennett et al., 2006). The findings of the PhD study showed that for professionals who have good reliable access to the Internet as most of the respondents did, then these barriers were infrequent and not the most concerning to the professional dentists studied. It is worth noting here that most of the previous studies in this area were conducted over 10 years ago when Internet access was much less widespread and less reliable for extensive study online.

Much of this previous research and that reviewed in Chapter 2 was carried out before the Internet was so prevalent as it is today (2016). Therefore the barriers and motivators identified in this research regarding other factors, such as travel to centres for practical components, the importance of courses being approved by Dental Councils and the relevance of the course content may have become prominent for those contemplating continuing professional development.

7.7 Summary

The use of technology and the Internet by physicians is increasing annually. Although there is a growing body of research about computer and technology use, prior to this PhD study, specific research about professional dentists' use of technology and the Internet for continuing professional development remained limited. This study has shown that there are still several barriers in their way: time, workplace demands, lack of confidence and skills with the computer and the Internet, lack of social interaction, and problems with the technology. The Internet can provide continuing education for professional dentists in many forms and in a variety of locations. The research suggests that physicians and professional dentists can benefit from online continuing education and professional development, particularly if it is interactive, self-directed, supports collaboration with other professionals, and is easy to use. The content must be of a high quality and based on 'evidence-based practice' guidelines. It must be flexible and responsive to the needs of the practitioners facing a myriad of challenges on a daily basis. The Internet has these capabilities so it is especially important to understand the physicians' and professional dentists' experiences and requirements so programmes can be designed to meet their needs.

7.8 Discussion: implications for CDP for Dentists

The finding from the results of Q3 (Chapter 5, Section 5.4.1.3) which surveyed Dentists working in General Practice, Hospitals or Universities showed that more university and hospital based dentists participate in conferences, workshops, and seminars for their CPD, while more practitioner dentists (GDPs) participated in classroom and work-based courses. This may reflect the effects of workplace contexts on the preferred tuped of CPD for these different professional groups.

Often GDPs work in small private practices and they may appreciate the opportunity to mingle with other colleagues. On the other hand, the majority of dentists who work in hospitals, clinics, and other larger workplace environments may prefer the convenience and collegiality offered through classroom and work based courses and resources. While each group gave a medium importance rating for both structured and self-directed continuing professional development, there was a major divergence between these two groups' perceptions of the amount of time needed for these endeavours. Less than a fifth of the university and hospital dentists (19.9%) compared to over 80% of the GDPs believed more time should be spent on continuing professional development. Although university and hospital based dentists attend more structured continuing professional development sessions than GDPs, both groups (University/hospital and General Practice) spend almost the same time per day on self-directed continuing professional development. On the surface, it appears that GDPs may perceive the need to attend more structured sessions. This question requires further exploration given the implications for employers and time allocated for GDPs' structured continuing professional development.

The survey results of Q3 (N= 116) (Chapter 5 Section 5.4.1.2) and Q4 (N=201) (Chapter 6 Section 6.2.2) showed that computer access is almost universal

for both groups (University/Hospital and General Practice) and they are using computers over ten hours on average per week. There are differences in the type of computers available to them. Most university and hospital based dentists (85%) (see Figure 5.3, Chapter 5) now have access to computers at work and this finding differs from many studies reported earlier in the literature. GDPs also have more access to portable devices (i.e., laptops and personal digital assistants) than the other group. These findings have implications for educational planners. Using portable devices may be a factor to consider when designing educational opportunities for GDPs, whereas this may be less of an issue for the other group that infrequently use portable devices but have extensive access to computers at work.

Both groups have almost universal access to the Internet and to e-mail (See Chapter 5 Section 5.4.1.2 and Chapter 6 Section 6.2.2). There is somewhat less access to other technologies such as CD-ROMs and DVDs and considerably less access to audio and video conferencing. Overall, access to high speed Internet is high and increasing across India and it should not continue to impede access to Internet programmes and resources. Both groups make extensive use of e-mail and both of these professional groups use the Internet to surf for non-course related information.

The review in Chapter 2 has shown that the use of online resources for personal CPD is growing rapidly enabling the 'diffusion of innovation' literature to be a resource available to all professionals. It would be worthwhile to explore it further in subsequent studies.

7.9 Implications for the Theoretical Framework

In my literature review in Chapter 3, it was noted that Entwistle had analysed the results of the studies conducted at 17 different university departments and the factors which had been measured to investigate the impact of educational innovation

in students' learning in higher education. According to Entwistle (2004) and other educational researchers, the recognized practice in researching innovation in teaching and learning communities must be reorganized into an inclusion model as opposed to the traditional model in which "research into powerful learning environments was concentrated mainly on general influences on student's engagement and learning" (Entwistle, 2004). Research into student, teacher and course provider factors were also important to design effective online learning environments in higher education. By researching into student barriers and preferences for online courses, I was able to understand subjective student factors better and thus design the teaching-learning environment accordingly to develop a Master's programme at King's College London Dental Institute. This framework was used to underpin the design of the questionnaire and analysis used in this research.

The theory of planned behaviour suggests that attitude, situated norm and perceived control affect the planned behavior of a person. In this case, when two behaviours :– considering an online course and preparedness to travel, are considered, the attitudes to CPD, how it is perceived by significant others (Council, fellow practitioners and patients) and facilitators/ barriers such as cost, time, length, topic, recognition, having practical component etc. come into play while people are considering the course.

From the results of this PhD research, Entwistle's model of Higher Education may be readdressed to incorporate issues that were found to pertain specifically to an online learning environment. The research reported in this thesis has shown that many of the factors identified previously by Entwistle have been important in terms of the potential impact on students' learning, such as the perceptions about a course

(CPD): the influence of others on the importance of studying, cost, duration of course and so forth.

Firstly, both components of a CPD course: theoretical and practical need to be considered. Secondly, the relevance of the topic and having a practical component were shown to be preferred by most professional dentists in this research. There are several non-academic issues of the course such as cost, length, recognition and status which may also affect the uptake and eventual performance in the course. Learners' attitudes to CPD and their prior experience with courses (both short term or online) would have influenced their instructional conceptions. Their willingness to participate in an online course necessitates that the learner be independent. Therefore their learning orientation may be academic (for being up to date) or certificate oriented (for career development).

The majority of the dentists (practitioners, teachers, consultants) as potential CPD learners has access to the Internet and is familiar with using it for seeking information. Therefore, they have certain conceptions regarding the online learning environment. They were quite clear that the practical component is an important part of a Dental CPD programme (see Chapter 6; Table 6.4). Based on the above findings, modifications have been suggested to Entwistle's model of Higher Education to accommodate learning in the online environment in dentistry as is shown in Fig. 7.1 below

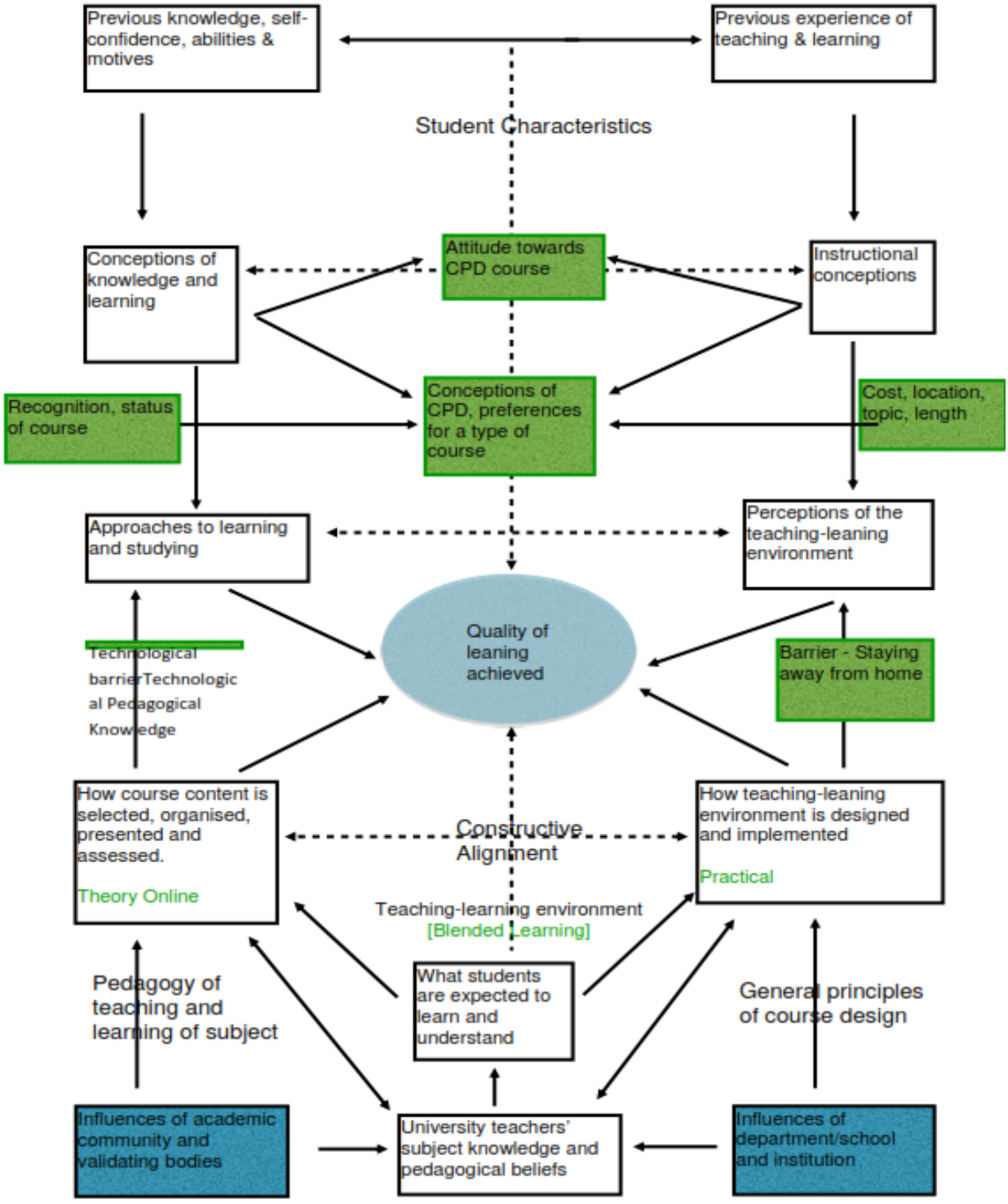

Figure 7.1 Amended Entwistle Model for Components for Blended Learning for CPD programmes

If we compare the original model shown in Chapter 3, Fig. 3.3, then the findings of this PhD research show that the following components need to be included:

For conceptions and knowledge of the course:

1. Recognition of the course status;
2. Conceptions of CPD and preference of a particular type of course;
3. Cost, location, topic and length.

The teaching and learning environment also needs to address which particular components are delivered in a blended learning programme and which media is being used:

1. Theory online and/or face-to-face;
2. Practical – face-to-face component;

An important difference between the types of higher education courses analysed empirically by Entwistle and the findings of this study is that the majority of their courses were compulsory undergraduate university courses, so students would not have the option to select particular modes of delivery, or specific topics within a particular programme. Whereas for people following blended or online courses for their professional development, the choice to follow the course is usually optional therefore the barriers and factors shown in this amended model are very important in determining how to design successful CPD programmes.

The findings in this research also have very important implications for results from previous studies discussed in the literature review in Chapter 2. For example, Bach et al. (2007) and Bawane and Spector (2009) had emphasized the need for training of instructors for online teaching. Panda and Mishra's (2007) study had

brought to the fore that faculty attitude and motivations are important factors determining a shift from traditional DE mode to a web-enabled mode. Students' attitudes towards computers and access to the Internet were considered as important variables that affect teaching in an E-learning environment in India. Our study reinforces the findings of all the studies where attitude and motivation are important factors in taking up online courses. Internet access and speed were important variables.

These research results also have significance for the further development of MOOCs (Massive online open courses) which have in recent years emerged as an important development in online learning courses for very large cohorts of students via increased participation and open access for students using the web and at the same time attempting to ensure both quality and quantity. Some of the early MOOCs have been developed by prestigious universities and regarded to have a quality assurance guarantee because of their reputations in delivery traditional education. However, according to Daniel (2012), who reviewed the short history of MOOCS and set them in the wider context of the evolution of educational technology and distance-learning, it is a "myth that professors distinguished by their research output are competent to create online courses without help" (p12).

Our revised Entwistle model (Fig. 7.1) and the empirical findings in this PhD research show that the success of MOOCs will be determined not only by careful pedagogical design (Daniel, 2012, Hayes, 2015) but also whether or not the potential student prefers, needs or wants a face-to-face component included in his or her CPD course, whether the course has a high status, whether it is delivered by a prestigious respected institution, how the course is selected, organized and presented, recognition of status of course, conceptions of knowledge, conceptions of CPD,

preferences for type of course, cost, location, topic, and attitude. There is now a rapid growth in the development and production of MOOCs but as yet little evidence of their long-term success. Clearly, it will be some time, may be with the use of haptic technologies before professional dentists can have their clinical (fine motor, hand-eye coordination etc.) skills taught and measured at a distance. The significant majority of the subjects in this PhD 4 surveys showed that the professional dentists wanted a practical face-to-face component as part of any CPD course. These findings and the model produced provide a distinct contribution to the knowledge required for the successful design and implementation of MOOCs.

7.10 Limitations of the Research

The nature of this research and the geographical spread imposed certain limitations to the study. Although the questionnaires provided a comprehensive insight into the general perspective about CPD with its advantages in career progression and updating information, the main purview of our study pertained to assessing attitudes of general dental practitioners and dental professionals towards CPD. The statistics drawn from the research should be applicable to general dental practitioners. Therefore, it was vital to select an unbiased sample. However, the size of the sample selected was small when compared to the number of general practitioners across the whole of India (30,000 dentists qualifying every year).

The stratification of the sample was done by breaking down the data into the 20 different Indian states. However, the stratification itself might not completely represent the sex ratio as the size of the sample was relatively small. It is also difficult to know the exact influence of gender on a candidate's decision to choose distance education.

The research was primarily done in India. Any research done in one country might not represent the same in another country. It is also a human tendency to give more data which supports the host nation or setup which might have influenced the final outcome of the study, for example an emphasis on recognition by the Dental Council of India.

In the questionnaire itself some of the responses were elaborated by the respondents whereas some other questions were not. Some in-depth interviews of a cross–section of the survey respondents would have provided deeper insights into their detailed responses and illuminated further some of the findings. The expectation was that the evidence provided by the survey would reveal the enabling factors and barriers for adopting distance education by professional dentists. The limitations of this survey had mainly to do with the design of the instrument. Although the questionnaires were piloted twice and based on extensive previous empirical and theoretical findings, additional variables might have been included for other cohorts and as explained above for studies conducted in other countries.

7. 11 Implication and Recommendations

The main intention of conducting this research was to determine and understand what factors encouraged and acted as barriers, and the probability of adopting distance education courses to enable professional dentists to continue professional development. It was based on an extensive literature review, an analysis of relevant theoretical models and intense data analysis of four sequential surveys. The intent was to develop an increased understanding in this arena.

Based on the factors that emerged out of this study I can conclude that for dental surgeons in India, especially among the age group predominantly under 30 years of age, CPD was considered important. Also, about 73.1% of the respondents

showed that they were willing to consider an online course. Several factors however affected them while considering it. The major factors that affected their perceptions were suggested as having academic interest which is an extrinsic factor (progressing further up the academic ladder) and social which is an intrinsic factor (that of concern for helping people or contributing to society learner orientation). These were also reinforced in our literature review as suggested by Entwistle & Peterson (2004). These two motivational factors played a considerable role in them showing interest in pursuing CPD. They also considered the recognition of the course as very important. The third and fourth factors suggested that the respondents have a habit of reading journals and they think a CPD course is time consuming. An online theoretical component and a separate practical one were considered important as meeting their future CPD needs.

Similar results emerged when the analysis of factors underlying preparedness to travel was considered. The factor regarding official recognition of the course was not as important as that of having a practical component. The other factors that respondents would consider while choosing a course were: namely: topic of the course, practical component, cost of the course, and length or duration of the course. Avoiding travel and not being away from home is an important factor especially considering that a greater number of respondents were female belonging to 25-30 age group when most Indian women would settle down to married life and stay at home. The respondents considered recognition of course and its worldwide status also to be important. However, the course having a practical component and online theory component and location were considered least important. This implies that the course providers must offer courses which have relevant topics with a practical component at affordable prices considering that the Post-graduate dentistry courses

in India are highly priced. The course should also be approved by the Dental Council of India and also have worldwide reputation.

These same factors also influenced their preparedness to travel as well, especially overseas travel with more female respondents willing to travel overseas for the practical component. The loadings however were greater for recognition and status than for the combined factor of cost, practical component, topic and length. The implication for the course designer is that for these potential students a course needs to be recognized by the Dental Council and must have a clearly designed practical component with theory being provided either through online means or through study material.

From the results of my study the main contributions to knowledge were:

1) Age is a significant factor and predictor for professional dentists to taking up continuing professional development via distance-learning courses.
2) Other contributory factors to the uptake were progression through an academic career and contributing to society.
3) The barriers for the uptake for professional dentists to taking up continuing professional development via distance-learning courses were:

   - Cost of the course.
   - Duration of the course.
   - Distance of travel for the practical component.
   - The course not being recognised by the Indian Dental Council.
   - The course not having a practical component.

7. 12 The Future

Changes are always difficult to anticipate and the use of technology in the health care field is rapidly changing. Adaptation to these changes can be challenging for the busy dentist. Professional organizations, health care planners and educators have the responsibility to help prepare them for the future. This study contributes to understanding the current perceptions and experiences of general dental practitioners and university and hospital based dentists and it opens avenues for further exploration. Dentists in hospitals, universities and in general practice all reported using technology, particularly the Internet, increasingly. Since this survey was completed, the use of continuing professional development opportunities delivered online has increased as more programmes and services have become available. Concurrently, the technology and ease of use has improved, and health care systems have evolved in the way it delivers health care. More health care professionals have increased their competency in using technology-enabled programmes and services. Health care professionals have already identified many benefits and a decreasing number of barriers to using technology. This trend may increase and possibly accelerate in the future.

In the meantime, on-going support and skills training is needed to assist general dental practitioners and professional dentisits working in hospitals and universities to use these innovative technologies in their pursuit of learning and professional development. This support and training is becoming a reality as both private companies and publicly funded institutions (e.g., Health Authorities, hospitals and universities) develop strategies to deal with this requirement. It is

imperative to continue to examine the evolving conditions faced by these health care professionals and to respond with the best available information.

7.13 Recommendation for Future Research

Based on this research, the following recommendations for future research are offered:

1. This study could be repeated with more emphasis on factors related to barriers identified in this study to online learning to be taken into account while designing CPD courses for dentists.
2. Further research on barriers that learners may face during the actual course period is advocated.
3. This study could be repeated in a different geographical setting.
4. This research study could also be repeated using a different sample in the same geographical setting in order to consider differences in perceptions and attitude.
5. A survey could be developed and administered to further investigate perceptions of distance education among general dental practitioners in urban and rural communities.
6. The same instruments and theoretical models could be used to investigate similar barriers and enablers for those in other professions such as medicine, nursing, law, engineering and commerce.
7. A detailed study into outcome of such distance education programmes can be undertaken in order to compare the results from traditional methods of education.

8. Further investigation comparing levels of satisfaction in distance education classes when compared with traditional classroom will enhance the quality of study material used in respective delivery models.

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APPENDICES

Appendix 1: (Q1) Pilot questionnaire.

Distributed to the Year 1 Master in Clinical Dentistry (Prosthodontics) by distance-learning residential group.

A: AIMS

To test the format of a pilot questionnaire to determine the reasons of the candidates for enrolling onto the MClinDent distance-learning programme. Analysis of the questionnaire would enable to format questionnaires to determine the attitude, perceptions and reasons for uptake of distance-learning programmes leading to continuing professional development amongst dental graduates.

B: Questionnaire

Anonymous Information Questionnaire Year 2006

1. Country of residence UK/Europe non-UK/non-Europe
2. How did you hear about this course?
   ……..
3. Why did you select this distance-learning course rather than the traditional in-house equivalent?
   …….
4. If your practice is in the UK are you predominantly private/mixed NHS & private/NHS
5. Did you compare this course to other in-house courses? Yes/No
6. Did you compare this course to other distance-learning courses? Yes/No
7. Are you aware of other distance-learning courses in a similar subject? Yes/No
8. Would you be interested in attending a clinical training attachment (e.g. 2 days/week for 3 years) near to your home in a local hospital under specialist supervision in order to get on to a specialist list, provided you also had MFDS if in the UK? Yes/Maybe/No

9. How would you rate the following factors while you were considering applying for this course:
   - Easier access if on-line Very important/important/not relevant/not important.
   - International Status of KCL Very important/important/not relevant/not important
   - Ability to continue working in Practice while studying for a

Post-graduate qualification. Very important/important/not relevant/not important.
- **Reducing disruption to your**
Family while studying. Very important/important/not relevant/not important
- **Ability to stay at home and**
Not have to study in London. Very important/important/not relevant/not important

Appendix 2: Q1 Pilot questionnaire results

Frequency Table: 1

Variables	N (%)
Country of Residence	
UK	14 (60.9)
Non Europe	7 (30.4)
NR	2 (8.7)
Heard about the course	
BDJ advert	6 (26.1)
Internet	7 (30.4)
Family/Friend	5 (21.7)
Journal/Magazine	3 (13.0)
Others	2 (8.7)

Table 2

Why this type of learning

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Easy Family Life	6	26.1	26.1	26.1
	Suits workload	1	4.3	4.3	30.4
	Better Finacially	2	8.7	8.7	39.1
	Flexibility	5	21.7	21.7	60.9
	Not Leaving practice	6	26.1	26.1	87.0
	Other	3	13.0	13.0	100.0
	Total	23	100.0	100.0	

Table 3

Type of Practice in the UK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NR	8	34.8	34.8	34.8
	NHS	4	17.4	17.4	52.2
	Private	6	26.1	26.1	78.3
	Mixed	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

Table 4

Comparison with other In-house courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	47.8	47.8	47.8
	No	9	39.1	39.1	87.0
	NR	3	13.0	13.0	100.0
	Total	23	100.0	100.0	

Table 5

Comparison with other Distance Learning courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	34.8	34.8	34.8
	No	11	47.8	47.8	82.6
	NR	4	17.4	17.4	100.0
	Total	23	100.0	100.0	

Table 6

Aware of other Distance Learning courses

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	17.4	17.4	17.4
	No	16	69.6	69.6	87.0
	NR	3	13.0	13.0	100.0
	Total	23	100.0	100.0	

Table 7 - Clinical Attachment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	47.8	47.8	47.8
	Maybe	6	26.1	26.1	73.9
	NR	6	26.1	26.1	100.0
	Total	23	100.0	100.0	

Table 8

Easier Access if on-line

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	13	56.5	56.5	56.5
	Important	7	30.4	30.4	87.0
	Not Important	1	4.3	4.3	91.3
	NR	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Table 9

International Status of KCL

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	13	56.5	56.5	56.5
	Important	7	30.4	30.4	87.0
	Not Relevant	1	4.3	4.3	91.3
	NR	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Table 10

Ability to continue working

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	19	82.6	82.6	82.6
	Important	2	8.7	8.7	91.3
	NR	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Table 11

Reduce disruption to family

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	11	47.8	47.8	47.8
	Important	5	21.7	21.7	69.6
	Not Relevant	4	17.4	17.4	87.0
	Not Important	1	4.3	4.3	91.3
	NR	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Table 12

Ability to stay at home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	13	56.5	56.5	56.5
	Important	5	21.7	21.7	78.3
	Not Relevant	1	4.3	4.3	82.6
	Not Important	2	8.7	8.7	91.3
	NR	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Cross tabulations

Table 13

Country of Residence * How did you hear about the course Crosstabulation

Count

		How did you hear about the course					
		BDJ Advert	Internet	Family or Friend	Journal or Magazine	Other	Total
Country of Residence	UK	5	3	3	2	1	14
	Non Europe	0	4	1	1	1	7
	NR	1	0	1	0	0	2
Total		6	7	5	3	2	23

Table 14

Country of Residence * Why this type of learning Crosstabulation

Count

		Why this type of learning						
		Easy Family Life	Suits workload	Better Finacially	Flexibility	Not Leaving practice	Other	Total
Country of Residence	UK	4	1	1	3	4	1	14
	Non Europe	1	0	1	2	1	2	7
	NR	1	0	0	0	1	0	2
Total		6	1	2	5	6	3	23

Table 15

Country of Residence * Type of Practice in the UK Crosstabulation

Count

		Type of Practice in the UK				
		NR	NHS	Private	Mixed	Total
Country of Residence	UK	0	4	5	5	14
	Non Europe	6	0	1	0	7
	NR	2	0	0	0	2
Total		8	4	6	5	23

Table 16

Country of Residence * Comparison with other In-house courses Crosstabulation

Count

		Comparison with other In-house courses			
		Yes	No	NR	Total
Country of Residence	UK	8	5	1	14
	Non Europe	2	4	1	7
	NR	1	0	1	2
Total		11	9	3	23

Table 17

Country of Residence * Comparison with other Distance Learning courses Crosstabulation

Count

		Comparison with other Distance Learning courses			
		Yes	No	NR	Total
Country of Residence	UK	5	7	2	14
	Non Europe	3	3	1	7
	NR	0	1	1	2
Total		8	11	4	23

Table 18

Country of Residence * Aware of other Distance Learning courses Crosstabulation

Count

		Aware of other Distance Learning courses			
		Yes	No	NR	Total
Country of Residence	UK	3	10	1	14
	Non Europe	1	5	1	7
	NR	0	1	1	2
Total		4	16	3	23

Table 19

Country of Residence * Clinical attachment Crosstabulation

Count

		Aware of other Distance Learni courses (MFDS)			
		Yes	Maybe	NR	Total
Country of Residence	UK	10	4	0	14
	Non Europe	1	2	4	7
	NR	0	0	2	2
Total		11	6	6	23

Table 20

Country of Residence * Easier Access if on-line Crosstabulation

Count

		Easier Access if on-line				
		Very Important	Important	Not Important	NR	Total
Country of Residence	UK	9	3	1	1	14
	Non Europe	4	3	0	0	7
	NR	0	1	0	1	2
Total		13	7	1	2	23

Table 21

Country of Residence * International Status of KCL Crosstabulation

Count

		International Status of KCL				
		Very Important	Important	Not Relevant	NR	Total
Country of Residence	UK	8	5	0	1	14
	Non Europe	5	1	1	0	7
	NR	0	1	0	1	2
Total		13	7	1	2	23

Table 22

Country of Residence * Ability to continue working Crosstabulation

Count

		Ability to continue working			
		Very Important	Important	NR	Total
Country of Residence	UK	11	2	1	14
	Non Europe	7	0	0	7
	NR	1	0	1	2
Total		19	2	2	23

Table 23

Country of Residence * Reduce disruption to family Crosstabulation

Count

		Reduce disruption to family					
		Very Important	Important	Not Relevant	Not Important	NR	Total
Country of Residence	UK	5	4	3	1	1	14
	Non Europe	6	0	1	0	0	7
	NR	0	1	0	0	1	2
Total		11	5	4	1	2	23

Table 24

Country of Residence * Ability to stay at home Crosstabulation

Count

		Ability to stay at home					
		Very Important	Important	Not Relevant	Not Important	NR	Total
Country of Residence	UK	7	3	1	2	1	14
	Non Europe	6	1	0	0	0	7
	NR	0	1	0	0	1	2
Total		13	5	1	2	2	23

Discussion of Questionnaire 1 Results

The majority of participants were from the UK. The questionnaire does not ascertain from which region or town they are. The rest of the participants were all non-European. A large number of the UK participants heard about the course from the British Dental Journal (BDJ) whereas the non-European participants learnt about it from the Internet. The reasons for choosing this type of course were varied but were better represented from question 9 and the responses from question 2 are duplicated. Out of the 7 non-European participants there were 6 no responses to question 4. This could be due to the fact that the term NHS is unfamiliar with this group. A significant number of the UK participants compared this course with in-

house courses. There are in house MClinDent courses available in the UK and this could be the reason for this. The responses to questions 6 and 7 could be due to the fact that there are currently no similar programmes available. The majority of the UK participants expressed an interest to attend a clinical training attachment in order to get on to a specialist list. For both the UK and non-European group the factors listed in question 9 were listed as very important or important. The responses listed for question 2 reflected the factors which were listed in this section.

The design of the final questionnaires would take into account the findings from this pilot. The format of this should allow for the responses to be recorded in a way which would allow statistical analysis for example a Chi-Square test to be applied.

Appendix 3: Q2 - Questionnaire

Reference Code:

Confidentiality Statement

Participation in this survey is voluntary and all personal information received will be held in strict confidence. No personal information will be released to any party without prior written consent. For study purposes you may be individually contacted to clarify responses and/or to answer additional study questions pertaining to your responses. If you have any further questions about how the answers to this questionnaire will be handled, please feel free to contact Dr. Subir Banerji: Email**:** subir.banerji@kcl.ac.uk.

Questionnaire

Please answer the questions truthfully. There are no right or wrong answers. These questions are designed to evaluate your perception of continuing professional development (CPD) and are completely anonymous. Your responses will be treated with the strictest confidence.

Your time, patience and participation are much valued.

Section 1: Background

1.1 Which age group do you belong to? Please tick the appropriate box

Under 25 years	
25 to 30 years	
31 to 35 years	
36 to 40 years	
Over 40 years	

1.2 Are you male or female? Please tick the appropriate box

Male	
Female	

1.3 How long ago did you obtain your first dental qualification? Please tick the appropriate box.

Less than 5 years	
5 to 10 years	
More than 10 years	

1.4 How long have you spent in the following (in years)? Please use the appropriate box to indicate your answer.

General practice	
Hospital	
University	
Other (Please specify) _____ _	

1.5 Do you have access to a computer with high speed Internet facilities? Please tick the appropriate box.

Yes	
No	

1.6 Do you use the Internet to get information regarding professional matters? Please tick the appropriate box

Yes	
No	

Section 2: Continuing Professional Development (CPD)

2.1 Is there an official requirement for you to undertake post-graduate study to maintain your registration with the Dental Council? Please tick the appropriate box.

Yes	
No	

2.2 On average approximately how many study days have you attended per year since BDS? Please tick the appropriate box.

None	
Less than 10 days	
10 to 20 days	
More than 20 days	

2.3 Please indicate your view of the following factors when having to choose a course?

For each of the following items please tick the number that is appropriate under one of the four categories which applies:

1 - **Not important** 2- Not relevant 3- Important 4 - **Very important**

	1	2	3	4
Topic				
Cost				
Avoid travelling away from home				
Length of course				
Recognition of course attended by your dental council				
Where the course is held				
Course providers are private companies				
Course providers are home universities				

Course providers are foreign universities				
Worldwide status of the university delivering the course				
For such a course would you consider a hands on practical component?				
Do you think that your dental council considers CPD to be?				
Do you believe that your fellow professionals believe that a recognized post-graduate programme is?				
Do you think that your patients consider post-graduate education?				

2.4 Have you ever participated in a course which had an online component? Please tick the appropriate box.

Yes	
No	

2.5 Would you consider a course which had an online component delivering theoretical aspects via the Internet directly to your computer? Please tick the appropriate box.

Yes	
No	

2.6 Would you be prepared to travel to attend the practical component of the course? Please tick the appropriate box.

Yes	
No	

2.7 How far would you be prepared to travel to attend the hands on practical component of the course? Please tick the appropriate box.

	Yes	No
Another City		
Abroad		
No Preference		

2.8 If, for the majority of the course requirements you were able to complete at home online would you consider enrolling on this course? Please tick the appropriate box.

Yes	
No	

2.9 Do you consider continuing dental education important in your career development? Please tick the appropriate box.

Yes	
No	

2.10 Please indicate your response to the following statements relating to Post-graduate education.

For each of the following statements please tick the number that most closely reflects your opinion under one of the five categories:

1 – Strongly **disagree;** 2 – Disagree; 3 – Uncertain; 4 – Agree; 5 - Strongly **agree**

	1	2	3	4	5
Continuing Professional development (CPD) is important.					
CPD is important in your career development.					
CPD keeps you up to date with developments					
CPD is too time consuming					
Acquiring CPD via reading journals is adequate					

CPD via a recognised course is more useful.					
CPD delivered by a distance-learning programme with a practical component is adequate.					
Theoretical concepts of a subject can be delivered adequately on-line via the Internet.					
The distance-learning programme needs to be recognised by your dental council					
Post-graduate education enhances your career?					
Obtaining a post-graduate qualification improves your profile amongst your fellow professionals?					

2.11 Please indicate your view of the following factors when having to choose a course?

For each of the following items please tick the number that is appropriate under one of the five categories which applies:

1 – Extremely **undesirable** 2 - Undesirable 3 – Not concerned

4 - Desirable 5 - Extremely **desirable**

	1	2	3	4	5
Would you consider a distance-learning programme which had a practical component and an on line component					
Would you consider not travelling away from home for CPD					
Would you consider the course to be counted towards a specialist qualification					
Would you consider the recognition of the course by Dental Councils in other countries					

2.12 Please indicate in YEARS the maximum time you would be prepared to spend on a course resulting in a qualification recognised by your Dental Council _____**years.**

Appendix 4: Q2 questionnaire results

Frequency Table

Code

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	001/1	1	4.3	4.3	4.3
	001/10	1	4.3	4.3	8.7
	001/11	1	4.3	4.3	13.0
	001/12	1	4.3	4.3	17.4
	001/13	1	4.3	4.3	21.7
	001/14	1	4.3	4.3	26.1
	001/15	1	4.3	4.3	30.4
	001/16	1	4.3	4.3	34.8
	001/17	1	4.3	4.3	39.1
	001/18	1	4.3	4.3	43.5
	001/19	1	4.3	4.3	47.8
	001/2	1	4.3	4.3	52.2
	001/20	1	4.3	4.3	56.5
	001/21	1	4.3	4.3	60.9
	001/22	1	4.3	4.3	65.2
	001/23	1	4.3	4.3	69.6
	001/3	1	4.3	4.3	73.9
	001/4	1	4.3	4.3	78.3
	001/5	1	4.3	4.3	82.6
	001/6	1	4.3	4.3	87.0
	001/7	1	4.3	4.3	91.3
	001/8	1	4.3	4.3	95.7
	001/9	1	4.3	4.3	100.0
	Total	23	100.0	100.0	

1.1 Age group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 25 years	3	13.0	13.0	13.0
	25 to 30 years	9	39.1	39.1	52.2
	31 to 35 years	5	21.7	21.7	73.9
	36 to 40 years	2	8.7	8.7	82.6
	Over 40 years	4	17.4	17.4	100.0
	Total	23	100.0	100.0	

1.2 Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	10	43.5	43.5	43.5
	Female	13	56.5	56.5	100.0
	Total	23	100.0	100.0	

1.3 Years since qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 years	6	26.1	26.1	26.1
	5 to 10 years	6	26.1	26.1	52.2
	More than 10 years	11	47.8	47.8	100.0
	Total	23	100.0	100.0	

1.4 Type of workplace

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	general practice	1	4.3	4.3	4.3
	Hospital	10	43.5	43.5	47.8
	University	12	52.2	52.2	100.0
	Total	23	100.0	100.0	

1.5 High speed Internet facilities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	78.3	78.3	78.3
	No	5	21.7	21.7	100.0
	Total	23	100.0	100.0	

1.6 Use the Internet to get information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	100.0	100.0	100.0

2.1 Undertake study to maintain registration with Dental Council.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	30.4	31.8	31.8
	No	15	65.2	68.2	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.2 Study days per year since BDS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	1	4.3	4.5	4.5
	Less than 10 days	1	4.3	4.5	9.1
	10 to 20 days	6	26.1	27.3	36.4
	More than 20 days	14	60.9	63.6	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.3.1 Topic

		Frequency	Percent	Valid Percen	Cumulative Percent
Valid	Not	1	4.3	4.8	4.8
	Important	6	26.1	28.6	33.3
	Very Important	14	60.9	66.7	100.0
	Tota	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.2 Cost

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not relevent	1	4.3	4.8	4.8
	Importan	19	82.6	90.5	95.2
	Very Important	1	4.3	4.8	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.3 Avoid travelling away from home

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	4	17.4	19.0	19.0
	Not relevent	3	13.0	14.3	33.3
	Important	12	52.2	57.1	90.5
	Very Important	2	8.7	9.5	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.4 Length of course

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	5	21.7	26.3	26.
	Important	9	39.1	47.4	73.
	Very Important	4	17.4	21.1	94.
	5	1	4.3	5.	100.0
	Total	19	82.6	100.0	
Missing	System	4	17.4		
Total		23	100.0		

2.3.5 Recognition of course

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	3	13.0	14.3	14.3
	Not relevent	1	4.3	4.8	19.0
	Important	8	34.8	38.1	57.1
	Very Important	8	34.8	38.1	95.2
	5	1	4.3	4.8	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.6 Where the course is held

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	5	21.7	23.8	23.8
	Not relevent	2	8.7	9.5	33.3
	Important	9	39.1	42.9	76.2
	Very Important	4	17.4	19.0	95.2
	5	1	4.3	4.8	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.7 Course providers are private

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	7	30.4	33.3	33.3
	Not relevent	5	21.7	23.8	57.1
	Important	5	21.7	23.8	81.0
	Very Important	4	17.4	19.0	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.8 Providers are home universities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	5	21.7	23.8	23.8
	Not relevent	6	26.1	28.6	52.4
	Important	6	26.1	28.6	81.0
	Very Important	4	17.4	19.0	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.9 Providers are foreign universities

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	5	21.	25.0	25.0
	Not relevent	4	17.	20.0	45.0
	Important	6	26.	30.0	75.0
	Very Important	5	21.	25.0	100.0
	Total	20	87.	100.0	
Missing	System	3	13.		
Total		23	100.0		

2.3.10 Worldwide status of the uni delivering the course

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	1	4.3	5.0	5.0
	Not	1	4.3	5.0	10.0
	Importan	9	39.1	45.0	55.0
	Very	9	39.1	45.0	100.0
	Tota	20	87.0	100.0	
Missing	Syste	3	13.0		
Total		23	100.0		

2.3.11 Consider a hands on practical component

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not relevent	1	4.3	4.8	4.8
	Important	8	34.8	38.1	42.9
	Very Important	11	47.8	52.4	95.2
	5	1	4.3	4.8	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.12 Dental council consider CPD's to be

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	2	8.7	10.0	10.0
	Not relevent	1	4.3	5.0	15.0
	Important	12	52.2	60.0	75.0
	Very Important	5	21.7	25.0	100.0
	Total	20	87.0	100.0	
Missing	System	3	13.0		
Total		23	100.0		

2.3.13 Fellow professionals believe that a post grad program

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	2	8.7	9.5	9.5
	Not relevent	2	8.7	9.5	19.0
	Important	7	30.4	33.3	52.4
	Very Important	10	43.5	47.6	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.3.14 Your patients consider post grad education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Important	1	4.3	5.0	5.0
	Not relevent	1	4.3	5.0	10.0
	Important	10	43.5	50.0	60.0
	Very Important	8	34.8	40.0	100.0
	Total	20	87.0	100.0	
Missing	System	3	13.0		
Total		23	100.0		

2.4 Participated in a course which has an online component

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	34.8	38.1	38.1
	No	13	56.5	61.9	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.5 Consider a course which had an online component

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	95.7	100.0	100.0
Missing	System	1	4.3		
Total		23	100.0		

2.6 Prepared to travel to attend practical component

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	20	87.0	90.9	90.9
	No	2	8.7	9.1	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.7.1 Another city

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	43.5	100.0	100.0
Missing	System	13	56.5		
Total		23	100.0		

2.7.2 Abroad

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	39.1	81.8	81.8
	No	2	8.7	18.2	100.0
	Total	11	47.8	100.0	
Missing	System	12	52.2		
Total		23	100.0		

2.7.3 No preference

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	34.8	88.9	88.9
	No	1	4.3	11.1	100.0
	Total	9	39.1	100.0	
Missing	System	14	60.9		
Total		23	100.0		

2.8 Consider enrolling if majority of the course can be conducted at home online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ye	20	87.0	90.9	90.9
	No	2	8.7	9.1	100.0
	Tota	22	95.7	100.0	
Missing	Syste	1	4.3		
Total		23	100.0		

2.9 Consider continuing dental education important in your career development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	22	95.7	100.0	100.0
Missing	System	1	4.3		
Total		23	100.0		

2.10.1 CPD is important

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	4.3	4.5	4.5
	Agree	9	39.1	40.	45.5
	Strongly agree	12	52.2	54.	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.10.2 CPD is important in your career development

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	4.3	4.5	4.5
	Uncertain	1	4.3	4.5	9.1
	Agree	9	39.1	40.9	50.0
	Strongly agree	11	47.8	50.0	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.10.3 CPD keeps you up to date with developments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	4.	4.5	4.5
	Agree	11	47.8	50.	54.5
	Strongly agree	10	43.5	45.	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.		
Total		23	100.0		

2.10.4 CPD is too time consuming

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	8.7	9.1	9.1
	Disagree	8	34.8	36.4	45.5
	Uncertain	5	21.7	22.7	68.2
	Agree	6	26.1	27.3	95.5
	Strongly agree	1	4.3	4.5	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.10.5 Acquiring CPD by reading journals is adequate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	12	52.2	57.1	57.1
	Uncertain	4	17.4	19.0	76.2
	Agree	5	21.7	23.8	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.10.6 CPD via a recognized course is more useful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	8.7	9.1	9.1
	Uncertain	4	17.4	18.2	27.3
	Agree	14	60.9	63.6	90.9
	Strongly agree	2	8.7	9.1	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.10.7 CPD with practical component is adequate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	17.4	18.2	18.
	Uncertain	4	17.4	18.2	36.
	Agree	11	47.8	50.0	86.
	Strongly agree	3	13.0	13.6	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.10.8 Theoretical concepts can be delivered adequately online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	4.3	4.8	4.8
	Uncertain	2	8.7	9.5	14.3
	Agree	16	69.6	76.2	90.5
	Strongly agree	2	8.7	9.5	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.10.9 CPD needs to be recognized by your local dental council

		Frequency	Percent	Valid	Cumulative Percent
Valid	Disagree	2	8.	9.	9.
	Uncertain	2	8.	9.	18.
	Agree	7	30.	31.	50.
	Strongly agree	11	47.	50.	100.
	Total	22	95.	100.	
Missing	System	1	4.		
Total		2	100.		

2.10.10 Post graduate education enhances career

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	4.3	4.5	4.5
	Uncertain	2	8.7	9.1	13.6
	Agree	3	13.0	13.6	27.3
	Strongly agree	16	69.6	72.7	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.10.11 Improves profile amongst fellow professionals

		Frequency	Percent	Valid Percen	Cumulative Percent
Valid	Uncertain	1	4.3	4.5	4.5
	Agree	5	21.7	22.7	27.3
	Strongly agree	16	69.6	72.7	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.11.1 Consider a distance learning program (CPD) - practical & online

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Extremely undesirable	1	4.3	4.5	4.5
	Not concerned	1	4.3	4.5	9.1
	Desirable	16	69.6	72.7	81.8
	Extremely desirable	4	17.4	18.2	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

2.11.2 Consider not travelling away from home

		Frequency	Percent	Valid Percer	Cumulative Percent
Valid	Undesirable	4	17.4	19.0	19.0
	Not concerned	9	39.1	42.9	61.9
	Desirable	7	30.4	33.3	95.2
	Extremely desirable	1	4.3	4.8	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.11.3 Consider the course to be counted towards a Specialist qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undesirable	1	4.3	5.0	5.0
	Not concerned	1	4.3	5.0	10.0
	Desirable	10	43.5	50.0	60.0
	Extremely desirable	8	34.8	40.0	100.0
	Total	20	87.0	100.0	
Missing	System	3	13.0		
Total		23	100.0		

2.11.4 Consider the recognition of the course by Dental Councils in other countries

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undesirable	3	13.0	14.3	14.3
	Not concerned	2	8.7	9.5	23.8
	Desirable	5	21.7	23.8	47.6
	Extremely desirable	11	47.8	52.4	100.0
	Total	21	91.3	100.0	
Missing	System	2	8.7		
Total		23	100.0		

2.12 Maximum time prepared to spend on a course

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	8.7	8.7	8.7
	1yr	3	13.0	13.0	21.7
	2yr	10	43.5	43.5	65.2
	3yr	6	26.1	26.1	91.3
	5yr	2	8.7	8.7	100.0
	Total	23	100.0	100.0	

Appendix 5: Q3 Questionnaire.

Reference Code:

Confidentiality Statement

Participation in this survey is voluntary and all personal information received will be held in strict confidence. No personal information will be released to any party without prior written consent. For study purposes you may be individually contacted to clarify responses and/or to answer additional study questions pertaining to your responses. If you have any further questions about how the answers to this questionnaire will be handled, please feel free to contact Dr. Subir Banerji: Email**:** subir.banerji@kcl.ac.uk.

Questionnaire

Please answer the questions truthfully. There are no right or wrong answers. These questions are designed to evaluate your perception of continuing professional development (CPD) and are completely anonymous. Your responses will be treated with the strictest confidence.

Your time, patience and participation are much valued.

Section 1: Background

1.1 Which age group do you belong to? Please tick the appropriate box

Under 25 years	
25 to 30 years	
31 to 35 years	
36 to 40 years	
Over 40 years	

1.2 Are you male or female? Please tick the appropriate box

Male	
Female	

1.3 How long ago did you obtain your first dental qualification? Please tick the appropriate box.

Less than 5 years	
5 to 10 years	
More than 10 years	

1.4 How long have you spent in the following (in years)? Please use the appropriate box to indicate your answer.

General practice	
Hospital	
University	
Other (Please specify) _____	

1.5 Do you have access to a computer with high speed Internet facilities? Please tick the appropriate box.

Yes	
No	

1.6 Do you use the Internet to get information regarding professional matters? Please tick the appropriate box

Yes	
No	

Section 2: Continuing Professional Development (CPD)

2.1 Is there an official requirement for you to undertake post-graduate study to maintain your registration with the Dental Council? Please tick the appropriate box.

Yes	
No	

2.2 On average approximately how many study days have you attended per year since BDS? Please tick the appropriate box.

None	
Less than 10 days	
10 to 20 days	
More than 20 days	

2.3 Please indicate your view of the following factors when having to choose a course?

For each of the following items please tick the number that is appropriate under one of the four categories which applies:

1 - **Not important** 2- Not relevant 3- Important 4 - **Very important**

	1	2	3	4
Topic				
Cost				
Avoid travelling away from home				
Length of course				
Recognition of course attended by your dental council				
Where the course is held				
Course providers are private companies				
Course providers are home universities				

Course providers are foreign universities				
Worldwide status of the university delivering the course				
For such a course would you consider a hands on practical component?				
Do you think that your dental council considers CPD to be?				
Do you believe that your fellow professionals believe that a recognized post-graduate programme is?				
Do you think that your patients consider post-graduate education?				

2.4 Have you ever participated in a course which had an online component? Please tick the appropriate box.

Yes	
No	

2.5 Would you consider a course which had an online component delivering theoretical aspects via the Internet directly to your computer? Please tick the appropriate box.

Yes	
No	

2.6 Would you be prepared to travel to attend the practical component of the course? Please tick the appropriate box.

Yes	
No	

2.7 How far would you be prepared to travel to attend the hands on practical component of the course? Please tick the appropriate box.

	Yes	No
Another City		
Abroad		
No Preference		

2.8 If the for majority of the course requirements you were able to complete at home online would you consider enrolling on this course? Please tick the appropriate box.

Yes	
No	

2.9 Do you consider continuing dental education important in your career development? Please tick the appropriate box.

Yes	
No	

2.10 Please indicate your response to the following statements relating to Post-graduate education.

For each of the following statements please tick the number that most closely reflects your opinion under one of the five categories:

1 – Strongly **disagree** 2 - Disagree 3 – Uncertain 4 - Agree 5 - Strongly **agree**

	1	2	3	4	5
Continuing Professional development (CPD) is important.					
CPD is important in your career development.					
CPD keeps you up to date with developments					
CPD is too time consuming					
Acquiring CPD via reading journals is adequate					
CPD via a recognised course is more useful.					
CPD delivered by a distance-learning programme with a practical component is adequate.					
Theoretical concepts of a subject can be delivered adequately on-line via the Internet.					
The distance-learning programme needs to be recognised by your dental council					
Post-graduate education enhances your career?					
Obtaining a post-graduate qualification improves your profile amongst your fellow professionals?					

2.11 Please indicate your view of the following factors when having to choose a course?

For each of the following items please tick the number that is appropriate under one of the five categories which applies:

1 – Extremely **undesirable** 2 - Undesirable 3 – Not concerned

4 - Desirable 5 - Extremely **desirable**

	1	2	3	4	5
Would you consider a distance-learning programme which had a practical component and an on line component					
Would you consider not travelling away from home for CPD					
Would you consider the recognition of the course by Dental Councils in other countries					

2.12 Please indicate with a tick which of the following you would prefer:

1 year online and hands on course leading to a Certificate (60 EU credits).

2 year online and hands on course leading to a Diploma (120 EU credits).

3 year online and hands on course leading to a Masters (MSc) DEGREE (180 EU credits).

4 year online and hands on course leading to a Masters In Clinical Dentistry Degree (360 EU credits).

Appendix 6: Q4 Questionnaire Results

[Note: The numbers below represent the percentages of the responses i.e. 7% of the 201 were under 25 years of age, 43% of the 201 were males etc.]

Reference Code:

Confidentiality Statement

Participation in this survey is voluntary and all personal information received will be held in strict confidence. No personal information will be released to any party without prior written consent. For study purposes you may be individually contacted to clarify responses and/or to answer additional study questions pertaining to your responses. If you have any further questions about how the answers to this questionnaire will be handled, please feel free to contact Dr. Subir Banerji:

Email**:** subir.banerji@kcl.ac.uk.

Questionnaire

Please answer the questions truthfully. There are no right or wrong answers. These questions are designed to evaluate your perception of continuing professional development (CPD) and are completely anonymous. Your responses will be treated with the strictest confidence.

Your time, patience and participation are much valued.

Section 1: Background

1.1 Which age group do you belong to? Please tick the appropriate box

Under 25 years	7%
25 to 30 years	36%
31 to 35 years	31%
36 to 40 years	16%
Over 40 years	10%

1.2 Are you male or female? Please tick the appropriate box

Male	43%
Female	57%

1.3 How long ago did you obtain your first dental qualification? Please tick the appropriate box.

Less than 5 years	43%
5 to 10 years	36%
More than 10 years	21%

1.4 In which area are you currently employed? Please use the appropriate box to indicate your answer.

general practice	55%
Hospital	20%
University	25%
Other (Please specify)_____	0

1.5 Do you have access to a computer with high-speed Internet facilities? Please tick the appropriate box.

Yes	93%
No	7%

1.6 Do you use the Internet to get information regarding professional matters? Please tick the appropriate box

Yes	88%
No	12%

1.7 Which of the following could you reach in one hour's journey from home? Please tick the appropriate boxes

An international airport	50%
A national airport	70%
A mainline railway station	100%
A major highway	80%

Section 2: Continuing Professional Development (CPD)

2.1 For each of the following statements please tick the number that most closely reflects your opinion under one of the five categories:

1 – Strongly **disagree** 2 - Disagree 3 – Uncertain 4 - Agree

5 - Strongly **agree**

	1	2	3	4	5
Continuing Professional development (CPD) is important					
CPD is important in your career development					
CPD keeps you up to date with developments					
CPD is too time consuming					

Acquiring CPD via reading journals is adequate					
CPD via a recognised course is more useful					
CPD delivered by a distance-learning programme with a practical component is adequate					
A distance-learning programme must be recognised by your Dental Council					
Theoretical concepts can be delivered adequately online via the Internet					
Your Dental Council considers CPD to be important					
Your fellow professionals consider to be important					
Your patients consider CPD to be important					

2.2 Is there an official requirement for you to undertake post-graduate study to maintain your registration with the Dental Council? Please tick the appropriate box.

Yes	0
No	100%

2.3 On average approximately how many study days have you attended per year since BDS? Please tick the appropriate box.

None	2%
Less than 10 days	10%

10 to 20 days	52%
More than 20 days	36%

2.4 Have you ever participated in a course which had an online component? Please tick the appropriate box.

Yes	14%
No	86%

2.5 Please indicate your view of the following factors when having to choose a course.

For each of the following items please tick the number that is appropriate under one of the five categories which applies:

1 – Strongly **disagree** 2 - Disagree 3 – Uncertain 4 - Agree 5 - Strongly **agree**

	1	2	3	4	5
Topic is important					
Cost is important					
Avoiding travel is important					
Avoiding spending an extended period away from home is important					
Length of course is important					
Recognition of course your Dental Council is important					
Where the course is held is important					

Worldwide status of the institution delivering the course is important					
A hands on practical component is important					
A distance-learning programme with a practical component and an online component is desirable					
Not travelling away from home for CPD is desirable					
Recognition of the course by Dental Councils in other countries is desirable					

2.6 Would you consider a course which had an online component delivering theoretical aspects via the Internet directly to your computer? Please tick the appropriate box.

Yes	62%
No	38%

If your response was **YES** then please could fill in 2.8.
If your response was **NO** then please proceed to 2.7.

2.7 For each of the following items please tick the number that is appropriate under one of the five categories which applies:

1 – Strongly **disagree** 2 - Disagree 3 – Uncertain 4 - Agree
5 - Strongly **agree**

	1	2	3	4	5
Unfamiliar with technology					
No confidence in reading material without help of teachers					
Internet speed low					
Cannot sit with computer for long					

2.8 Would you be prepared to travel to attend the practical component of the course? Please tick the appropriate box.

Yes	82.1%	Please go to question 2.9
No	17.9%	Please go to question 2.10

2.9 How far would you be prepared to travel to attend the hands on practical component of the course? Please tick the appropriate box.

	Yes	No
Another city in the same State	63.2%	36.8%
A city in a different State	52.7%	47.3%
Abroad	24.4%	75.6%

2.10 Please tick which of the following types of course you would prefer:

1 year online and hands on course leading to a Certificate (60 EU credits)	1
2 year online and hands on course leading to a Diploma (120 EU credits)	2
3 year online and hands on course leading to a Masters (MSc) DEGREE (180 EU credits)	8
4 year online and hands on course leading to a Masters In Clinical Dentistry Degree (360 EU credits)	3

2.11 Please put a tick in the box next to the topic which interests you most?

Topic 1 – Fixed and Removable Prosthodontics	1 2
Topic 2 – Aesthetic Dentistry	5 8
Topic 3 – Dental Implants	1 2
Topic 4 - Endodontics	1 4
Topic 5 - Paedodontics	3
Topic 6 – Dental Radiology	1